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President,
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Keynote Lectures

Poor eating among adolescents and young adults - what are we to do?

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For the last century, we have been very much focussed on managing malnutrition and undernutrition in people of all ages. This has been a worldwide phenomenon. With the growth of nutrition science, the identification of nutrients and the development of our knowledge on the diet-disease relationship, we have made great strides in eradicating many of the diseases caused by nutrient deficiencies - or have we? The growth of overweight and obesity among young people is a major concern, the rise in nutrient insufficiency is a major concern, and the cost of diet-related diseases is a major concern. Do these issues stem from poor eating, changes in nutrient needs or changes in the food supply?

Some trend data from Australia indicate that over the last 40 years, there has been a rise in overweight children from 2-4% in 1960 to 10% in 1985 to 20% in 1995. One of the main issues with these data is the speed with which the increase is now happening. We know that children in the top quarter of BMI are 11.7 times more likely to develop the cluster of risk factors associated with heart disease as adults(1). So, what are we to do?

Education *alone* is not enough to change behaviours. We need to deal with societal and environmental factors which support or inhibit behaviour change. The Karelia study (1972-1992)(2) demonstrated that the use of more appropriate foods such as fat reduced milks increased with the number of years of schooling. The Singapore "Trim and Fit" programme with intense teacher training consisting of a holistic environmental approach including a pool of special physical training instructors and home economists; assessment and grading; approval and monitoring of school canteen food; provision of catering and fitness equipment; and provision of printed education materials, has proven successful with both primary and secondary students in terms of reducing the rates of obesity. There is also good evidence that using peer pressure will improve eating habits.

Leaders must identify and prioritise community health needs and support organisational ability to meet these needs. We must be bold. The science indicates that there are many programmes which can be successful, especially in the short term, but it is in the long-term, sustainability of change that the challenge lies. We need concerted efforts between health providers, educationists and food producers to make a difference.

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Global regulatory status of health claims - an update

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There has been increased interest and activities in the development of health claims for foods in various regions of the world. The United States of America Food and Drugs Administration (USFDA) is the first country that has established a comprehensive system for permitting food industries to make health claims on food labels. There are three ways by which the USFDA allows health claims to be made on a label or dietary supplement: (a) the 1990 Nutrition Labeling and Education Act authorised health claims that meet significant scientific agreement; (b) health or nutrient content claim based on authoritative statements permitted by the 1997 Food and Drug Administration Modernisation Act (FDAMA); and (c) qualified health claims permitted under the 2003 FDA Consumer Health Information for Better Nutrition Initiative. Each of these types of claims are summarised and examples discussed in the presentation. The Codex Alimentarius, the global FAO/WHO food standards system, has adopted in June 2004 guidelines on nutrition and health claims which encompass nutrient function claim, other function claim and disease risk reduction claim. Conditions that must be met before these claims are made are provided in the guidelines. Various claims related to official dietary guidelines or health diets are also described. In relation to this, Codex is also developing guidelines for the scientific substantiation of claims. The Food Standards of Australia-New Zealand permits only one health claim, that related to folate consumption and foetal neural tube defect. There was a proposal, in the middle of 2003, for a regulation of the European Parliament and of the Council on nutrition and health claims made on foods. Various requirements for the regulation were set out in the proposal. In Japan, health claims are permitted only for one type of food, namely Foods for Specified Health Use (FOSHU). Health claims are permitted for 8 categories of these functional foods. In several Southeast Asian countries (Indonesia, Malaysia, Philippines, Singapore and Thailand), health claims are permitted only in the Philippines and Indonesia. For these two countries, the permitted claims are similar to those of the USFDA. The International Life Sciences Institute (ILSI) Southeast Asia Region, through a series of workshops, is continuing with its efforts to explore a consistent approach for scientific substantiation of health and disease-related claims in the region. In Malaysia, the Food Safety and Quality Division of the Ministry of Health Malaysia Working Group shall use the experiences of these countries, as well as input from all organisations participating in the dialogue in the consideration and development of future progress for health claims in the country.

Symposium 1: Nutrition & Youth (I)

Body image perception among adolescents in Malaysia: are there any gender differences?

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This paper reports the perception of body image among adolescents in the Northern, Central and Southern Peninsular Malaysia. A total of 3221 adolescents comprising of 1514 boys and 1707 girls between the ages of 12 to 15 years from urban and rural areas participated in this multi-centre study. Weight and height were measured and body mass index (BMI) calculated. A body image questionnaire (BIQ) was used to determine the body image perception among subjects. Body

distortion was evaluated from the difference between the actual BMI category and their perception. Modified Stunkard's figure rating was used to determine the score of body shape perceptions. The results showed that 87% of adolescents were concerned about their body. One in three boys and girls (1:3) respectively in the central and southern regions had body distortion. The same trend was observed in the northern region for both genders. However, based on BMI, a higher body distortion was likely to occur only among normal weight girls. The results also indicated that there was a significant correlation between body distortion and BMI only among the girls in the northern region. The mean score for body shape perceptions for ideal figure, health and attractiveness were lower among the girls than the boys. But comparison between regions showed that the mean score for body shape perception of those in the northern region were higher than their central and southern counterparts. In conclusion, there was a subtle difference in the body image perception between boys and girls but a bigger distinction was observed in body distortions especially between contrasting weight categories. A body image education package has been developed and tested for educating adolescents about appropriate body image.

Body distortion and eating disorders in young women: a review of current situation in Malaysian universities

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This is a review of six local studies on various aspects of body image distortion and eating disorders among university students in Malaysia. Body image distortion was assessed through perception of body weight status, perception of body size using *Contour Drawing Rating Scale* and body parts satisfaction using *Body Cathexis Scale*. The *Eating Attitude Test* was the most common instrument used in the six studies to measure eating attitudes and behaviours, specifically in identifying respondents prone to eating disorders. Kee (2003) conducted a study to assess the presence and severity of eating disorder pathology among 292 college women in Kuala Lumpur, whereas Nur Aifaa (2003) and Enita (2001) determined the perception of body image, and dieting behaviours among 90 and 100 predominantly Malay female university students respectively. Lim (2001) carried out a study of body image perception and related factors among 100 predominantly Chinese female university students while Siti (2003) studied the perception of body image among 80 Malay university students. In contrast, Ling (2002) conducted a comparative study between two major ethnic groups, namely Malays and Chinese, with a total sample of 217 female students. For body image, the highest prevalence of incorrect perception of body weight status was 53.0% (Enita, 2001 and Lim, 2001). Across body weight status, more normal weight respondents had incorrect perception of their body weight status than underweight and overweight respondents. Utilising the *Contour Drawing Rating Scale*, it was found that a majority of the respondents were dissatisfied with their body size and desired a smaller body size (Ling, 2002; Enita, 2001, Lim, 2001; Nur Aifaa, 2003; Siti, 2003). Most of the respondents chose figures 3 (Nur Aifaa, 2003), 4 (Lim, 2001) and 5 (Ling, 2005) as their ideal body sizes. A majority of the respondents were dissatisfied with their overall body parts (Lim, 2001; Nur Aifaa, 2003; Siti, 2003). However, Ling (2002) showed a significant difference between Malay and Chinese respondents whereby most of the Malay students were satisfied with their body parts compared to Chinese respondents ($p < 0.05$). Based on the *Eating Attitude Test*, between 9 to 35 percent of the respondents in the six studies were identified as being prone to eating disorders. Body distortion and eating disorders are an emerging problem in this society and more studies on young women are warranted.

Relationship between bone health status, anthropometric measurements and body fat percentage among young female adults

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Optimal bone health status during the young adult stage is important to maximise peak bone mass and reduce the risk of osteoporosis, especially among females. The college years are an opportune time for intervention in the primary prevention of osteoporosis. A cross-sectional study was carried out to determine the relationship between bone health status, anthropometry and body fat percentage among 332 female students in UPM, Serdang. Information on the socio-demographic characteristics was collected using a self-administered questionnaire. Bone health status, weight, height and body fat percentage were assessed using an ultrasound machine (QUS-2J), weighing scale (TANITA), body metre (SECA) and body fat analyser (HBF-302 Omron), respectively. Data were analysed using the Statistical Package for Social Sciences (SPSS), version 12.0.1 The mean age of the subjects was 21.7±1.3 years; T-score was -0.096±1.4 and broadband ultrasound attenuation (BUA) was 87.5±17.3 dB/MHz; weight was 51.5±8.7 kg; height was 158.5±5.6 cm; body mass index (BMI) was 20.5±3.2 kg/m² and percentage of body fat (%BF) was 26.2±5.5%. Based on BMI classification, 26.5% of the subjects were underweight and 9.6% were overweight and obese. According to the WHO (1994) classification, 72.9% of the subjects have normal bone health status (T-score >-1.0). About 3% of the subjects were classified as osteoporotic (T-score<-2.5) and 23.8% were osteopenic (-2.5# T-score #>-1.0). BUA was found to have significant positive correlations with body weight (r = 0.397, p<0.001), %BF (r = 0.397, p<0.001), and BMI (r = 0.436, p<0.001). Similarly, T-score also showed significant positive correlations with age (r = 0.115, p < 0.05), body weight (r = 0.397, p < 0.001), %BF (r = 0.393, p < 0.001) and BMI (r = 0.434, p<0.001). About one-quarter of the subjects were underweight and had poor bone health status. Therefore, campaigns and educational programmes to create awareness about osteoporosis and bone health are needed among young female adults, such as university students. Such preventive measures are important to promote optimal bone health status and to reduce the risk of osteoporosis in later years.

Symposium 2: Nutrition & Youth (II)

Cardiovascular disease risk factors among overweight and obese young Malaysian adults

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The aim of the study was to examine the cardiovascular risk factors in a selected ethnic population of Kedah State in Malaysia. It has been reported in the last few years that industrialisation and rapid economic progress in Malaysia has resulted in lifestyle changes and increased health risks associated with obesity-related diseases like Type II diabetes. Cross-sectional data collected in the year 2004, from adult men (n=38) and women (n=52) in the age group of 18-50 years from the Malay, Chinese and Indian communities were used for this study. Standard questionnaires were used to get the data on ethnicity, sex, age, physical activity level and dietary habits. Waist-to-hip ratio (WHR) and Body mass index (BMI) were calculated using standard methods. Blood samples were taken after an overnight fast for analysis of risk factors namely, blood sugar, total serum cholesterol (TCH), high-density lipoprotein (HDL), low-density lipoprotein (LDL), and triglycerides (TG). The results

showed that the BMI values exhibited a high degree of association with lipid profiles. Classical risk factors, such as TCH, LDL and TG increased in association with the extent of westernisation of lifestyle. The overall age-adjusted prevalence of central obesity was found to be significantly higher in the Indian community compared to the other communities. The blood pressure and glucose levels were strongly associated with central obesity in all three ethnic groups, but this was highly significant in the Indian group. We conclude that hyperlipidaemia, coupled with overweight, is highly prevalent in this population, even among young adults. Malaysian health policies and the health care system needs to target young people so as to retain their traditional diet, and promote healthy eating as well as physical activity.

Dietary habits of undergraduates in a public university in Kuala Lumpur

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This is a cross-sectional study of undergraduates in a public university in Kuala Lumpur. A total of 2665 undergraduates were randomly sampled. A pre-tested questionnaire on socio-demographic characteristics, nutritional knowledge, dietary habits, meal patterns and other factors related to accommodation and expenses incurred etc, was self-administered by the subjects. This paper will only report the dietary habits and meal patterns of the subjects. 43.5% of the subjects were males, with Malays being the majority (58.3%), followed by Chinese (29.5%), Indians (6.0%) and Sabahan as well as Sarawakians (6.2%). 29.2% of the students skipped breakfast, 11.3% skipped lunch and 8.9% skipped dinner. There was no significant difference between genders ($p > 0.05$) in the skipping of breakfast. However, there were more females who skipped lunch and dinner ($p < 0.05$). There were persistently less Chinese students who skipped breakfast, lunch and dinner ($p < 0.001$). The main reasons for skipping breakfast were: no time; overslept; and did not like to eat in the morning. Reasons for skipping lunch and dinner were mostly the time factor or that they did not feel like eating. The type of foods eaten for breakfast were tea/coffee, milk, bread, nasi lemak, roti canai and cereals; while for both lunch and dinner were mainly rice, vegetables, chicken, fish, fruits and cordials. The results showed that the prevalence of skipping breakfast was alarmingly high and this problem needs to be rectified since breakfast is the most important meal of the day and skipping it might affect their concentration during lectures. Those who skipped breakfast might also tend to eat more during the day and this could lead to overweight problems if the habit persists in the future. Consumption of nasi lemak and roti canai for breakfast and cordials with the other meals reflect the Malaysian culture. However, the students should be made aware of the energy content of these foods. These young adults need to adopt healthy eating habits so that the problems of over-nutrition can be reduced or prevented in future.

Personality and healthy body image

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The paper reports some preliminary findings on the relationship between personality trait profiles and body image. Samples consist of 370 respondents of diverse occupational backgrounds (male =

85, female = 285). Subjects were given a demographic questionnaire, Body-Image Questionnaire (BIQ) (Schweitzer & Cousson, 1998) and a short version of the NEO PI-R Personality Inventory, known as the Five Factor Inventory (FFI) (McCrae & Costa, 1995). The Malay translated version of the FFI was used (Mastor *et al.*, 2000). Based on the results of the personality survey, the females ranked significantly higher on Agreeableness ($t=-2.472$, $P < 0.05$) and Conscientiousness ($t=-2.983$, $P < 0.01$) than males. Correlation analyses indicated that body image is moderately and positively correlated with Extraversion ($r = 0.237$), Conscientiousness ($r=0.155$), Agreeableness ($r=0.198$) and Openness ($r=0.148$). Neuroticism is negatively related to body image ($r=-0.200$). Male samples scored higher significantly than female samples on the BIQ scores ($t=2.159$, $p < 0.05$). As hypothesised, obese women scored the lowest on the BIQ while the male students were the highest on the body image measure. Implications on the promotion of healthy lifestyle and diet are discussed.

Symposium 3: Young Investigators Symposium

Effect of red pitaya fruit (*Hylocereus Sp.*) supplementation on lipid profiles of induced hypercholesterolaemic rats

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This study was carried out to evaluate the hypocholesterolaemic effect of red Pitaya (*Hylocereus sp.*) on plasma lipid profiles of induced hypercholesterolaemia rats. Sixty Sprague Dawley male rats were divided into six groups. Groups 1 and 2 were the negative and positive controls, groups 3, 4, 5, were given red Pitaya fruit supplementation (300 g, 500 g and 700 g, equivalent to human consumption) and group 6 was given Lovastatin treatment (20 mg/kg). The control group 1 was fed with basal diet, while five other groups (2, 3, 4, 5, and 6) were given basal diet added with 1% cholesterol and 0.1% cholic acid, 30 g daily. The study period was 12 weeks, which consisted of 2 weeks for adaptation, 4 weeks for induced hypercholesterolaemia and the last 6 weeks for treatment. About 10 ml blood was taken from the aorta four times during the study, that was during baseline, first, third and final week of the treatment. Lipid profile was analysed using a chemistry auto-analyser (Hitachi). Results show that there was a significant difference ($p < 0.05$) in initial body weight among control groups (1 and 2) and treatment groups (3, 4, 5 and 6). The group supplemented with 700g red Pitaya had a significantly lower ($p < 0.05$) body weight increase (6.45%) as compared to other groups. The same group also showed a decrease in TC level (60.27%), LDL-C level (84.39%) and an increase in HDL-C level (78.44%). The group supplemented with 500g Pitaya showed the most reduction in TG level (60.16%). For total blood cholesterol, there was a significant decrease ($p < 0.01$) in both groups given red Pitaya and Lovastatin. Total cholesterol level for group 3 reduced (52.04%), group 4 (59.68 %), group 5 (60.27 %), and Lovastatin (55.19 %) as compared to the baseline level. The total cholesterol level in both control group 1 (4.5%) and control group 2 (14.55%) was not significantly different in value ($p > 0.01$). This study shows that supplementation of Pitaya fruit as much as 700g equivalent to human consumption reduced TC, TG, LDL-C and increased HDL-C levels in induced hypercholesterolaemia rats. Therefore, red Pitaya fruit has potentially great health benefits in reducing the risk factors for cardiovascular disease.

Measurement of energy expenditure among young adults: A comparison between heart rate monitoring and activity diary method

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Accurate yet inexpensive methods for measuring free-living energy expenditure (EE) are much needed. The aim of this study is to examine the feasibility of heart rate monitoring method (HRM) in measuring EE as compared to the established activity diary (AD) method. Minute-by-minute HRM and an activity diary (AD) were used simultaneously in 34 young Chinese adults (18 females, 16 males; mean age 21.5±1.5). Estimates of EE from HRM were based on individual calibration of heart rate and energy expenditure while energy expenditure from AD were calculated using both individually measured and published energy cost of various activities. Total energy expenditure (TEE) and its components (energy expenditure during sleep, during rest and during physical activity) and time spent at three different levels (sleep, rest and physical activity) were compared. TEE from HRM method averaged 8.17±2.00 MJ/day compared to 8.50±1.28 MJ/day from AD method. Although large intra-individual differences were found (ranging from -36.9% to 47.4%), there was no significant difference between the two methods (mean difference 3.6±19.4%). The limits of agreement (mean±2SD) were -3.77 MJ/day and 3.11 MJ/day. There were no significant differences for any of the TEE components between the methods, except for energy expenditure during sleep ($p < 0.05$). A significant method effect ($p < 0.05$) was observed for time spent in resting and physical activity. It may be concluded that HRM and AD methods are comparable for group assessment of TEE and its components, and for estimating physical activity pattern, although individual assessments lack precision.

The effect of boiling-cooling and steeping on proximate and resistant starch contents in maize, sorghum and wheat

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Cereal is one of the important staple foods rich in carbohydrate, especially fibre. Due to its unique characteristics, processing might affect the proximate and resistant starch (RS) contents in the cereal. Resistant starch has recently been found to be beneficial for diabetic subjects and prevention of colon cancer. Therefore, this study was conducted with the objectives of determining resistant starch content in common cereals and the effect of boiling-cooling and steeping treatments on the proximate and RS contents of the cereal. Three types of cereals, namely maize, sorghum and wheat were used in the study. The steeped treatment required soaking the seeds until they became saturated. The boiling treatment on the other hand required boiling the seeds until soft and refrigeration at 40°C overnight. The proximate analyses include ash, moisture and crude fibre contents using gravimetric method. The fat, carbohydrate and protein contents were determined using extraction of Soxhlet, Clegg Anthrone and micro-Kjeldahl methods respectively. Resistant starch was determined using the Berry's modified method. The results showed that the total carbohydrate content was significantly increased during steeping but decreased during boiling-cooling treatments ($p \leq 0.05$). Protein and crude fibre contents did not change significantly in both treatments ($p \geq 0.05$). Lipid content, on the other hand, reduced significantly in both treatments. The RS content in boiled-cooled and steeped maize significantly reduced from 2.263±0.298mg/100g to 1.071 mg/100g and 1.243 mg/100g respectively. However, in sorghum, no significant difference was

observed in RS content in all treatments. Steeping had increased RS content in wheat tremendously from 1.497 ± 0.166 mg/100g to 4.177 ± 0.177 mg/100 compared to boiling. In conclusion, steeping and boiling-cooling process does affect the proximate and resistant starch content of the three cereals studied.

Determination of glycaemic index of white bread with different types of spreads

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The acute glucose response after a meal often expressed as the glycaemic index (GI) has been documented overseas. In Malaysia, GI of white bread has been determined but white bread is commonly eaten with some form of a spread. Therefore, the aim of this study was to determine the glycaemic index of white bread with different types of spreads (margarine and sugar, RMG; peanut butter, RMK; pineapple jam and margarine, RJM). Each test food contained 50 g available carbohydrate, 8-24 g fat, 12-25 g protein and isocaloric. Eight healthy respondents volunteered for the study (4 men and 4 women, mean BMI 25.3 ± 0.5 kg/m², mean age 21.3 ± 0.5 years). Each respondent received oral glucose on three separate days as a reference food which contained 50 g of available carbohydrate. Capillary blood samples were obtained by finger prick at 0 (fasting), 15, 30, 45, 60, 90, 120 minutes after consuming the reference and test foods. Blood samples were analysed using triangle and trapezoid area principle. The GI value for RMG is 64 ± 10.1 (moderate GI); RMK is 54 ± 3.1 (low GI) and RJM is 55 ± 6.3 (moderate GI). There were significant differences ($p < 0.05$) between mean IAUC of glucose with all test foods. However, no significant difference ($p > 0.05$) was found between mean IAUC among all test foods. No correlation was found ($p > 0.05$) between BMI and fasting blood glucose ($r = 0.007$) and between BMI and IAUC ($r = 0.032$). In conclusion, adding certain types of spreads to the white bread has been found to be useful in reducing its GI value. Determining the GI of white bread with different spreads may help to control the postprandial blood glucose especially in diabetic patients as an alternative for them to include white bread in their daily diet.

Evaluation of photographs of Malaysian fruits for portion size estimation by young adults

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Photographs have been suggested as useful aids in assessing portion size for recording dietary intake. A study was carried out to evaluate photographs of Malaysian fruits from the "Album on Portion Sizes of Malaysian Foods" developed for the estimation of portion size in the National Food Consumption Survey (Ministry of Health, 2002). University Putra Malaysia undergraduates ($n = 80$), with a mean age of 21.05 ± 1.86 years and BMI of 21.19 ± 3.25 kg/m² participated through convenient sampling in this study. Actual fruit samples as shown in the album were prepared and displayed accordingly. Subjects observed the 28 kinds of fruits displayed and after which they recalled and identified the photos in the album. Subjects were asked to state a number which expressed the amount of fruits displayed as a fraction, multiple or percentage of the amount shown in the photograph. The number expressed was converted into weight in grams. The estimated weight was compared to the actual food weight and the degree of accuracy determined. Overall, 2240

responses were obtained for 28 fruits from 80 respondents. Of these, 1881 (84.0%) were correct estimations ($\pm 10\%$ of actual weight), 168 (7.50%) were underestimations ($< 10\%$ of actual weight) and 191 (8.50%) were overestimations ($> 10\%$ of actual weight). The fruits that were most frequently correctly estimated were a cut of green apple (93.75%), a whole green apple (92.50%), cube-shaped mango (91.25%), cube-shaped pineapple (91.25%) and a cut of orange (91.25%). The fruits most frequently overestimated were a whole water apple (22.50%) and green grapes (22.50%). Prunes (26.25%) and raisins (21.25%) were the fruits most frequently underestimated. Using the one sample t test, the mean estimated weight of a cut of honeydew, a mangosteen, a cut of guava, a water apple, star-shaped star fruit, a cut of mango, red grapes, green grapes, prunes and raisins were significantly different from the actual weight ($p < 0.05$). The mean degree of accuracy in estimated weights of all fruits did not differ significantly between male and female students. There was no significant correlation between BMI and the estimated portion sizes, except for cube-shaped mango ($p = 0.042$, $r = -0.228$) and a cut of pineapple ($p = 0.016$, $r = -0.267$). There was no relationship between observation time and degree of accuracy except for cube-shaped pineapple ($p = 0.046$, $r = 0.223$), half a kiwi ($p = 0.004$, $r = -0.320$) and a cut of watermelon ($p = 0.049$, $r = -0.221$). Photographs of nearly all fruits in the album, with the exception of a few, are useful and convenient aids for the correct estimation of portion size by young adults.

Body composition and waist circumference among adolescents with normal weight, overweight and obese

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A cross-sectional study was conducted to determine the body composition and waist circumference among normal weight, overweight and obese adolescents in Kuala Lumpur. A total of 400 students aged 13 to 17 years which comprised of Malays (44.6%), Chinese (27.8%) and Indians (24.3%), were recruited from six secondary schools in different zones in Kuala Lumpur. Questionnaires were used to assess knowledge, attitude and practice and also the perception of body image. Anthropometric measurements were also carried out. Mean body weight, height, Body Mass Index (BMI), waist circumference and hip circumference of the subjects were 58.2 ± 15.13 kg, 161.5 ± 8.15 cm, 22.3 ± 4.75 kg/m², 76.4 ± 12.26 cm and 93.3 ± 0.75 cm respectively. Body composition was measured using *BODYSTAT 1500MD*. Mean percent body fat was 22.4 ± 8.95 % and mean weight of body fat was 13.9 ± 8.55 kg. Prevalence of boys at risk of obesity (29.4%) was higher compared to girls (28.8%). Comparison of 50th percentile of waist circumference with age for boys was higher than girls. Body fat has a significant positive correlation ($p < 0.01$) with waist circumference ($r = 0.694$) and Body Mass Index (BMI) ($r = 0.703$). Regression between waist circumference and Body Mass Index (BMI) with body fat was ($R^2 = 0.481$, $p = 0.000$) and ($R^2 = 0.495$, $p = 0.000$) respectively with significant mean difference. Many of the adolescents consumed fast food 2-3 times a week. Most of the adolescents exercised 2-3 times a week for at least 20 minutes because they wanted to be healthy (41.0%) while those who never exercised stated laziness as their reason (4.5%). There were 82.5% who are concerned with their body weight. Most of them began to express concern about their body shape at the age of 12 years old. There were 40.2% of the subjects with body image distortion. Most of them (51.0%) chose health purposes for taking care of their body shape. Overall, most of the adolescents are of normal weight. However, the prevalence of obesity that is still increasing among them that warrants attention.

Symposium 4: Role of Foods in Health & Nutrition Promotion

Palm oil and cholesterol modulation: a physician's perspective

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Palm Oil is a vegetable oil and like all vegetable oils it is cholesterol free as defined by the presence of only negligible quantities of cholesterol when present. All animal fats have a high cholesterol and saturated fat content. High saturated fat intake raises blood cholesterol levels probably by down-regulating LDL-receptor activity in the liver, thereby reducing the rate of LDL-cholesterol removal by apoB receptors. Some vegetable oils like coconut oil have a high saturated fat content (94%) while palm oil contains 50% saturated fats. However the position of the fatty acid distribution in a triglyceride may influence the plasma cholesterol irrespective of the overall composition of the fats. The high monounsaturations at the crucial 2 position of the palm oil's triglyceride makes the oil as healthful as olive oil. Monounsaturated fats are healthful as it does not increase the 'heart unhealthy' LDL-cholesterol and it raises the cardioprotective HDL-cholesterol. Though polyunsaturated fats have an LDL-cholesterol lowering effect, the beneficial HDL-cholesterol also falls whereas saturated fats raises both the 'bad' LDL-cholesterol and the 'good' HDL-cholesterol. As a rule, for normal healthy individuals who do not have elevated cholesterol, palm oil is suitable as it does not raise the LDL-cholesterol. Since it is known in feeding experiments that the higher the polyunsaturated fat intake, the lower the LDL-cholesterol, so in patients with coronary artery disease, polyunsaturated fats would be beneficial. However, as the HDL-cholesterol is also important, monounsaturated fats would be preferable as it also raises the HDL-cholesterol besides lowering the LDL-cholesterol. Palm oil also has minor components like tocotrienols and beta-carotene with antioxidant and cholesterol lowering properties. Finally, unlike polyunsaturated fats which often require hydrogenation for cooking purposes and to improve its stability, palm oil requires little or no hydrogenation. Hydrogenation converts polyunsaturated fats to heart unhealthy saturated fats and trans fats. Trans fats raises the LDL-cholesterol, Lp(a) and depresses the 'good' HDL-cholesterol, all of which predispose to atherosclerosis and coronary artery disease.

Pro- & prebiotics for child health

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After the first scientific reports on the beneficial effects of lactic acid bacteria on health (Metchnikoff, 1907) this topic became silent during the introduction of antibiotics. As from the 1980s-1990s the interest in and evidence for using nonpathogenic bacteria for preventive and therapeutic purposes in a broad range of (clinical) conditions has grown extensively. Nowadays the number of blinded placebo-controlled human intervention trials on pro- and prebiotics is growing, whereas the knowledge on the composition, function and modulation of the intestinal microflora is increasing.

Besides the generally accepted effects of lactic acid bacteria on lactose intolerance, a large amount of scientific publications have appeared during recent decades on numerous health effects of so-called pro- and prebiotics. Probiotic as well as prebiotic products are available in many different forms worldwide, including pills, powders, foods, and infant formula. Numerous health benefits have been reported of which their effects in diarrhoea and allergy have probably the most relevance for infant nutrition.

Intestinal microflora

Many beneficial effects of a healthy balanced gut microflora have been described, including the provision of a barrier against pathogenic intruders and an essential role in the priming and development of the immune system. The microflora of Estonian infants was in many aspects similar to the flora prevailing in infants of Western Europe in the 1960s and 1970s (1), indicating a shift in the intestinal microflora among infants in Western industrialised countries, possibly as a result of changes in diet, living standards and antibiotic use. There is a marked parallel in the high incidence of atopic diseases seen in Western industrialised countries versus the formerly socialist countries of Europe with a lifestyle similar to that prevailing in Western Europe 30-40 years ago. It could be speculated that in Western communities, the intestinal microflora is, under normal conditions, able to cope quite well with pathogen challenges, but might lack in stimulating the immune system adequately. Exciting research such as those of Gordon and coworkers(2) on the commensal host-bacterial relationships (cross-talk) in the gut will eventually contribute to the understanding of the role of gut microflora in health and disease. It might also provide new leads for understanding the actions and the development of new pro- and prebiotics.

Probiotics

The application of probiotics (live) microbial food supplements which have beneficial effects on human health) in the treatment and prevention of acute diarrhoea is finding its way into medical practice. Several reviews have been published showing proven benefits for a selection of different strains. A recent meta-analysis showed that probiotic use shortens the duration of acute diarrhoea in children by almost one day (Figure 1). The most attention nowadays is on the effects of probiotics in the dietary management of allergic disease. The potential of specific probiotic bacteria was shown in several randomised double-blind placebo controlled clinical trials.

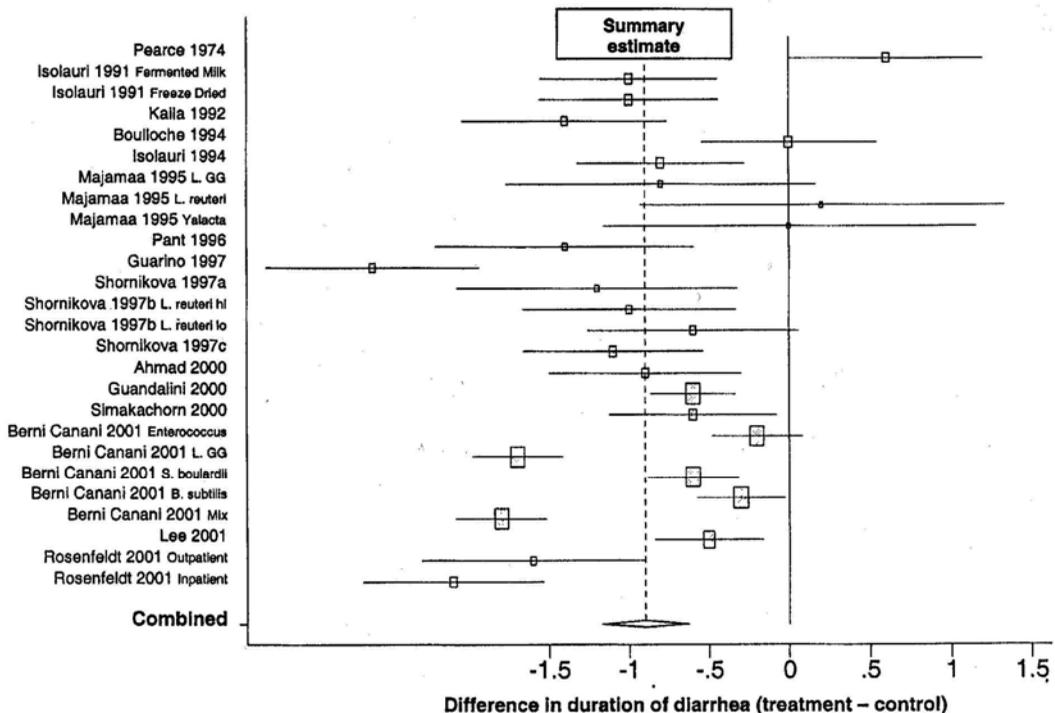


Figure 1 Forrest plot of studies included in the meta-analysis(3). Duration of diarrhea in days.

Prebiotics

Documentation of the effects of prebiotics, which could be described as non-digestible components selectively fermented by one or a small group of intestinal bacteria resulting in improvements of host health, with respect to diarrhoea and/or allergy is much more scarce. Diarrhoea prevention has, until present time, not been convincingly demonstrated in either adults or children, although there have been attempts to ameliorate the diarrhoea associated with antibiotics and travel, but without success (4). Because of the promising findings on probiotics in the management of food allergy, prebiotics could possibly have potential too. By selective stimulation of proposed beneficial gut bacteria such as bifidobacteria, as has been shown for fructans and galactans, one could imagine that this will ultimately lead to desired immune stimulation. However, species of bifidobacteria have been shown to differ between healthy and atopic individuals (5), whereas species associated with atopic infants showed diminished adhesion to human intestinal mucous (6) and increased pro-inflammatory cytokine production (7). Rather than aiming at increasing bifidobacteria per se, possibly the real challenge will be to engineer tailor-made subspecies specific prebiotics.

Conclusion

Probiotics, in particular, have high potential in the management of diarrhoea and seem very promising in case of allergy. Much more work still needs to be done however, including experimental studies (elucidation of mechanism) and large scale intervention studies in at risk infants providing further evidence for the safety and effectiveness of specific (combinations of) pro- and prebiotics. One such trial is currently on the stocks at FN in which, among others, the immediate and long-term effect of probiotic intervention on cow's milk allergy and protection against other allergic conditions will be evaluated.

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Folic acid-fortified milk increases red blood cell folate concentration in women of childbearing age

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Background - Folic acid (about 400 microg/day) taken around the time of conception significantly reduces the risk of bearing a child with a neural tube defect (NTD). Strategies to reduce NTDs with folic acid include supplement use and fortified foods. One fortification option is to add folic acid to milk powder formulated for use by women prior to and during pregnancy. It is uncertain whether folic acid fortified milk reduces NTD-risk. However, NTD risk has been inversely associated with red cell folate (RCF) concentrations.

Objective - To determine whether consuming folic acid-fortified (375 µg/day) milk increases RCF and plasma folate concentrations in women of childbearing age compared to an equivalent amount of unfortified milk, over 12 weeks. A second aim was to determine the effect of fortified milk on plasma homocysteine concentration, a functional indicator of folate status.

Design - Seventy-three women (aged 18-47 years) were randomised for 12 weeks to receive either a fortified milk powder (ANMUMTM, NZNew Zealand Milk Ltd) or unfortified (control) milk powder. Participants were instructed to consume 75 g of milk powder as two servings per day. Both milks provided 38 microg of naturally-occurring folate per day. The fortified milk provided an additional 375 microg of folic acid per day. The control milk powder was a blend of whole milk and a skim milk powder that was blended to match the fat level of the fortified milk. Blood samples were collected at baseline, 6 and 12 weeks.

Results - Sixty-six women completed the trial. Consuming the fortified milk caused RCF concentrations to rise markedly so that by week 12 the mean (95% CI) concentration was 539 nmol/L (436, 641) higher in those consuming the fortified milk than those consuming the control milk ($P < 0.01$). The mean plasma folate concentration in participants consuming the fortified milk was 35 nmol/L (30, 41) higher at week 12 than in those taking the placebo ($P < 0.01$). Women consuming the fortified milk had a 14% lower mean homocysteine concentration at week 12 than women consuming the control milk ($P < 0.01$).

Conclusion - Milk fortified with folic acid (375 µg/day) substantially increases RCF and plasma folate and lowers plasma homocysteine concentration over 12 weeks in women of childbearing age. Milk powder fortified with folic acid can increase women's RCF concentrations and would be expected to reduce the risk of bearing a child with a NTD. *New Zealand Milk Limited funded the study and provided the milk powders.*

Emerging science on maternal and early childhood nutrition

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Research continues to evolve around the effects of nutrients like docosahexaenoic acid (DHA), folic acid, vitamin D, zinc, and iron, including research on the relationship between maternal status and early childhood mental and physical developmental outcomes. Recent studies link DHA supplementation of mothers during pregnancy and lactation to IQ and cognitive benefits in their offspring between the ages of 2 and 5 years. Studies also find a correlation between infant DHA status at two months, and language production and comprehension at 14 and 18 months of age. Further, new

data on dietary intakes indicate that women in some countries do not meet dietary recommendations specific for DHA. Lastly, emerging research on maternal and fetal needs provides additional evidence regarding the link between inadequate iron, zinc, folic acid and vitamin D status, and poor fetal growth, motor development and/or other developmental outcomes. These data are particularly relevant because suboptimal status of multiple micronutrients is prevalent in some parts of Asia, and advances in the field of nutrition will allow us to apply this knowledge to improved health outcomes and public health policy.

Symposium 5: All Kinds of Everything Nutrition

Breastfeeding experience and growth of rural primary one schoolchildren in Tumpat and Bachok, Kelantan

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The falling rates and duration of breastfeeding in developing countries will predispose pre-school children to undernutrition and growth deficits if alternative sources of nutrition are inadequate. An undernourished child will be poorly prepared to begin his education when he reaches his school-going years. This is a cross-sectional study to study the association between breastfeeding experience and growth of 767 primary one schoolchildren from 18 schools in Tumpat and Bachok, Kelantan. A questionnaire was given to the mother of each child and the children were weighed and their height measured to determine their anthropometric indices. A total of 739 children (96.3%) were breastfed. The duration of breastfeeding was more than one year for 539 children (72.9%). Only 88 children (11.9%) were breastfed for less than 6 months while 37 children (5.0%) were breastfed for more than 24 months. The prevalence of underweight was 25.6%, stunting was 21.3% and wasting was 6.7%. There was no significant association between the duration of breastfeeding and the z-scores for weight-for-age (WAZ) and height-for-age (HAZ) of the children. However, there was an increasing trend in WAZ and HAZ with increasing duration of breastfeeding. Although breastfeeding rates and duration were found to be satisfactory in these communities, other environmental factors for undernutrition were still relevant. It is recommended that breastfeeding promotion be sustained to maintain the prevalence and duration of breastfeeding among rural mothers in these areas, perhaps focusing on the many other advantages of breastfeeding. For children who are identified as having undernutrition, participation in the School Supplementary Feeding Program (SSFP) is crucial for catch-up growth and to realise their potential during the school years.

Nutritional status and eating habits among preschool children in Klang Valley

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A cross sectional study was carried out to determine the nutritional status and eating habits among preschool children. A total of 3114 preschool children aged 4-6 years, comprising 1564 boys and 1550 girls representing the main ethnic groups, namely Malay, Chinese and Indian were randomly selected from 72 privately-owned kindergartens in the Klang Valley that participated in the Bright Start Nutrition programme. Anthropometric measurements included body weight, height, mid

upper arm circumference (MUAC), triceps, and subscapular skinfolds. Children were interviewed face-to-face with a set of questionnaire and pictures of relevant foods. Results showed that mean z-score for weight-for-age was -0.10 ± 1.56 , height-for-age was -0.24 ± 1.02 and weight-for-height was 0.03 ± 1.52 . Mean z-score for height-for-age was significantly different between boys and girls ($p < 0.001$). Significant difference was also observed between the three ethnic groups for mean z-score for weight-for-age and height-for-age ($p < 0.001$). The results also indicated that overnutrition is more prevalent than undernutrition. The prevalence of overweight was 8.8% while prevalence of underweight, stunting and wasting was 6.2%, 4.2% and 2.6%, respectively. The prevalence of overweight was highest among Indian girls (20.1%) while underweight and stunting was highest among the Malay boys at 10.6% and 7.1%, respectively. The findings indicated that majority of the children (87.9%) consumed breakfast every day. Most of the children liked milk (90.9%), fruits (95.6%) and fast food (92.9%) while a lower percentage of children (65.6%) liked vegetables. Approximately 84% of the children consumed milk often (4-7 days per week), while lower percentages of children were reported to consume vegetables (66.1%) and fruits (65.4%) often. Only 14.1% of the children consumed fast food often. Mean score for nutrition knowledge among children was $73.2 \pm 9.8\%$, of which 38.4% had good nutrition knowledge, 58.7% moderate and 2.9% poor. There was a significant difference ($p < 0.001$) between the three ethnic groups with Chinese children obtaining the highest mean score ($75.9 \pm 9.2\%$) followed by Malay children ($71.1 \pm 9.6\%$) and Indian children ($70.1 \pm 10.0\%$). Child's nutrition knowledge was associated with daily breakfast consumption ($\chi^2 = 8.02$, $p < 0.05$) and consumption frequency of milk ($\chi^2 = 12.82$, $p < 0.01$), vegetables ($\chi^2 = 12.86$, $p < 0.01$) and fruits ($\chi^2 = 12.00$, $p < 0.05$). The study indicates a high prevalence of overweight among young children and thus, the importance of nutrition knowledge and adapting nutrition education strategies among caregivers to improve nutritional status and eating habits among preschool children.

A nutrition module for health education; its effect on adolescents' nutrition knowledge, attitude and practice (The HELIC Study)

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The objective of the study was to determine the effect of classroom nutrition education using the nutrition module which had been developed by the IRPA grant of Healthy Lifestyle In Children (HELIC). The study involved 434 students aged 13 years old from secondary schools in Kuala Lumpur and Selangor. The study subjects were divided into intervention (n = 211) group and control (n = 223) group. The intervention group was pre-tested, taught the nutrition module, and post-tested. The control group was pre-tested and post-tested, but did not receive nutrition education. The instruments used to collect data at pre- and post-test were a nutrition knowledge, attitude and practice (KAP) questionnaire and a 3-day dietary recall form. The nutrition module consists of 5 nutrition topics comprising of education tools such as compact disk, flipchart, flash card, food picture cards, pamphlet and poster which was implemented to enhance the nutrition KAP in the intervention group. This module had been incorporated into the Physical and Health Education subject in schools for 5 weeks. This study found that nutrition knowledge score among underweight male subjects of the intervention group was increased significantly after the programme, as compared to the control group. The nutrition knowledge score of the female subjects in the intervention group also increased significantly as compared to the control group. The results showed that attitude score towards nutrition has improved among subjects with good levels in both intervention and control groups. The study also found that the energy intake in both intervention and

control group subjects did not meet the Malaysian RNI. As a conclusion, the nutrition module that has been taught in this study could improve the KAP particularly among the adolescents in Kuala Lumpur and Selangor.

Fat distribution and skinfold patterning secondary to obesity in adolescents

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The purpose of this study was to assess fat distribution and skinfold patterning relative to obesity level in male and female adolescents. Subjects (560 males, 18.01±1.19 years, 171.37±6.30 cm, 68.30±16.08 kg; 737 females, 17.63±0.77 years, 158.49±5.85 cm, 52.23±11.18 kg) were first year students from a private university in the Philippines. Fat distribution was expressed as waist-hip ratio (WHR), conicity index (C-index) and subscapular-triceps ratio (STR). The C-index was calculated as the waist girth (in meters) divided by 0.109 times the square root of body mass (kg) divided by height (m). Waist circumference was assessed at the narrowest part, while hip girth was measured at the greatest posterior protuberance. Skinfolds were taken from the triceps, subscapular, supraspinale, umbilical, anterior thigh and medial calf. Proportional skinfolds were derived by scaling to Phantom height. Obesity level was determined using body mass index (kg/m²) cut-off points for Asians and labeled underweight (U), normal weight (N), overweight (Ov), obese 1 (Ob1) and obese 2 (Ob2). A 2-way (Sex*Obesity) Manova was used to determine the differences in fat distribution and skinfold patterning by gender and obesity level. The Obesity effect ($p < 0.001$, $\eta^2 = 0.218$) for WHR indicated that Ov (0.80±0.08cm) had less central fat ($p < 0.001$) than Ob1 (0.84±0.09cm). However, the Obesity effect for STR was trivial ($p < 0.001$, $\eta^2 = 0.035$). The females had more fat on the thigh (-0.07±1.08 vs. -1.06±1.10, $p < 0.001$, $\eta^2 = 0.214$) but a lower WHR (0.74±0.06cm vs. 0.81±0.07cm, $p < 0.001$, $\eta^2 = 0.224$). There was no difference in C between U (1.08±0.07) and N (1.09±0.08, $p = 0.964$). The Obesity effect for the proportional umbilical skinfold ($p < 0.001$, $\eta^2 = 0.445$) indicated a higher value for Ob1 (1.02±1.25) and Ob2 (1.90±1.92) compared to Ov (0.17±0.97, $p < 0.001$ each). Although there were differences between gender and obesity in fat distribution and skinfold patterning, the effects were relatively small.

Influence of dietary fat composition on human postprandial lipaemia

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Evaluating dietary fats in the postprandial state opens a window of understanding on the mechanisms involved in exogenous lipid metabolism. The postprandial model is, therefore, a valid approach in assessing acute fat behaviour in relation to atherosclerotic and thrombogenic risk, as humans are naturally in this state throughout the day. Three series of postprandial studies were carried out using 20 normolipaemic human subjects consuming standard test fat challenges provided at 31% energy, namely a comparison of oils differing in P/S ratios, a comparison of different saturates (SFA) and a comparison between a natural fat and fats processed through hydrogenation and interesterification. A common postprandial protocol consisting of a crossover design was utilised and palm olein was used as a basis for comparisons in all these studies. The results of these postprandial studies showed HDL-C response after a meal was affected both by the P/S ratio of fats

as well as the SFA content of the dietary fat. Lipaemia as indicated, by circulating triacylglycerol (TAG) levels, was affected by the chain length of saturates but not by the P/S ratio of dietary fat in the diet. Interesterified fats generated a delayed chylomicron clearance, as there was a very high accumulation of VLDL-C. An unexpected observation was interesterified fat increased postprandial plasma glucose response. The findings of this study are highly relevant to the era of the metabolic syndrome, when 'global risk management' for cardiovascular disease includes elevated TAG and low HDL-C levels as independent risk factors. The presentation will also include a review on current findings in this field.

Poster Presentations

Group A: Nutritional Status (various groups) and Community Interventions

A01 The evaluation of food pyramid video in nutrition education among Malay children at the primary school in Temerloh, Pahang

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This study was done to determine the effectiveness of Food Pyramid video for the primary school children. A total of 94 children aged 8 years old participated in this study. This study involved 62 children from Sekolah Kebangsaan Paya Pulai, Temerloh as the intervention group and 32 children from Sekolah Kebangsaan Bangau, Temerloh as the control group. The video programme was designed to introduce food pyramid and healthy lifestyles to children. The video was shown to the children once in the first week, followed by comic reading session and worksheet in the second week, food pyramid drawing session at the third week. Changes of nutrition knowledge, attitude and practice among children who completed the programme (intervention group) were compared to the control group. The results indicate that the intervention group significantly ($p < 0.05$) improved their knowledge from $49.5 \pm 13.7\%$ to $59.2 \pm 16.6\%$ as compared to the control group. The mean of attitude scores also increased significantly ($p < 0.05$) in the intervention group from $74.7 \pm 19.2\%$ to $81.8 \pm 16.5\%$ compared to the control group. The intervention group also showed significant ($p < 0.05$) improvement in their nutrition practices as compared to the control group.

A02 Body image and energy balance among male bodybuilders in Kuala Lumpur

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This cross-sectional study was conducted in 6 public gymnasium centers in Kuala Lumpur. The purpose of this study was to determine the body image and energy balance of male bodybuilders. Dietary intake was estimated as a mean of a 2-day food recall method while energy expenditure was determined by time and motion study recorded simultaneously with the food recall. The nutritional status was assessed through anthropometric measurements. A questionnaire form was used to evaluate body shape perception and body parts satisfaction of the respondents. Fifty male

respondents with a mean age of 29.0 ± 6.9 years participated in this study. Mean height, mean body weight, and mean Body Mass Index (BMI) of the respondents were 1.7 ± 10.1 m, 70.11 ± 3.4 kg and 24.9 ± 5.5 kg/m² respectively. The mean percentage of body fat was $31.72 \pm 0.06\%$, indicating, generally, the respondents were "over fat", and their mean fat free mass index (FFMI) was 17.51 ± 5.54 kg/m² indicating, generally, the respondents were of a "frail" body shape. Daily mean energy intake was 2154.0 ± 847.8 Kcal with carbohydrate contributing 46.0%, protein 22.4% and fat 31.6% of total caloric intake. Among the respondents, 27 respondents (54%) took supplements and of these, 70.4% were taking protein powder in order to gain muscle mass. Daily mean energy expenditure was 3254.8 ± 737.1 Kcal and mean energy balance was -1100.83 Kcal. In addition, mean Basal Metabolic Rate (BMR) of the respondents was 1614.0 ± 135.5 Kcal/day and the mean Physical Activity Level (PAL) of the respondents was 2.00 ± 0.35 indicating their involvement in "heavy" physical activity. Thirty-eight respondents (76%) wished to achieve a muscular body shape and thus, a majority of them have a great intention to build muscle mass. Nevertheless, none of the respondents was identified as having any symptoms of developing "Muscle Dysmorphia" and most (54%) were satisfied with their body parts. There was no significant association between energy intake and discrepancy score with BMI. Similarly, there was no significant association between the number of years involved in bodybuilding and discrepancy score. However, there was a significant association between BMI with energy expenditure ($r = 0.64$, $p < 0.05$). In conclusion, a majority of the respondents wished to achieve a bigger size but mostly a negative energy balance. This study emphasises the need for nutrition programmes among male bodybuilders.

A03 Factors associated with overweight in Chinese primary school children

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This case control study aimed to compare 3 factors associated with childhood overweight, namely maternal perceptions of child's weight status, feeding practices and energy balance between normal weight (NW) and overweight (OW) children. A total of 134 OW Chinese children aged 12 years old were selected as cases from 2 primary schools in Kuala Lumpur through multistage sampling. Another 134 NW children were then selected as controls, matching for age, sex and race. About 59% of the NW and OW subjects were males and 41% of the NW and OW subjects were females. Subjects' BMIs were computed from weight and height values which were measured by using weighing scale (TANITA) and body meter (SECA). Mean BMIs for NW and OW subjects were 18.37 ± 1.82 kg/m² and 23.79 ± 2.15 kg/m² respectively. Maternal perceptions of child's weight status were determined by using the Child Figure Rating Scale. About 50% of the mothers of NW boys and (55.7%) girls (54.5%) were correct estimators who correctly identified their children's weight status. In comparison, more than 85% of mothers of OW boys (86.1%) and girls (87.3%) were also correct estimators. Feeding practices were measured in 3 different aspects namely maternal monitoring, restriction and pressure to eat by using the Child Feeding Questionnaire. In terms of maternal monitoring, NW and OW boys had almost similar mean scores of 2.15 ± 0.57 and 2.13 ± 0.52 . NW girls (2.23 ± 0.53) had higher mean score for maternal monitoring as compared to OW girls (2.13 ± 0.59). As for maternal restriction, NW boys and girls had mean scores of 2.03 ± 0.35 and 2.05 ± 0.39 . In comparison, OW boys and girls had higher mean scores for maternal restriction of 2.20 ± 0.25 and 2.21 ± 0.32 . Mothers of OW subjects reported keeping certain foods out of the child's reach and using foods as rewards. In terms of maternal pressure to eat, NW boys and girls had mean scores of 2.19 ± 0.46 and 2.33 ± 0.49 . In comparison, OW boys and girls had lower mean scores for maternal pressure to eat of 2.02 ± 0.46 and 2.02 ± 0.50 . Mothers of OW subjects reported their children can choose not to eat if they are not hungry. Energy balance was assessed by using 2-day-dietary and physical activity records.

Majority of NW boys (62.0%) and girls (52.7%) had negative energy balances with mean energy balance of -80.28 ± 344.86 kcal and -47.86 ± 376.83 kcal. In comparison, majority of OW boys (59.5%) and girls (74.5%) had positive energy balance with mean energy balance of 119.45 ± 372.48 kcal and 234.29 ± 345.71 kcal. Maternal perceptions of child's weight status, mean scores for maternal restriction and pressure to eat and mean energy balance differed significantly between NW and OW subjects for both boys ($\eta^2 = 100.87$; $t = -3.61$; $t = 2.38$; $t = -3.50$, $p < 0.05$) and girls ($\eta^2 = 70.38$; $t = -2.38$; $t = 3.25$; $t = -2.70$, $p < 0.05$). This implies that maternal perceptions of child's weight status, maternal restriction and pressure to eat and mean energy balance are factors that may contribute to development of childhood overweight and obesity. Interventions should be developed to educate mothers on how to help their children maintain healthy weight status such as using appropriate feeding practices and encouraging children to participate in physical activities.

A04 The validity and reliability of a diabetes prevention knowledge test

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The objective of this study was to examine the validity and reliability of a diabetes prevention knowledge test. The test was used for assessment of the knowledge of healthy lifestyle for the prevention of diabetes in the intervention study among women with previous gestational diabetes mellitus (GDM). The questionnaire was distributed to women aged 20 to 50 years old with education level of at least 10 years' formal education completed. The questionnaire consists of 11 items with 40 questions, mainly comprising questions about the risk factors of diabetes, healthy eating and physical activity. In the questionnaire, respondents were also asked whether they had ever received formal diabetes education. Differences between the respondents with and without formal diabetes education were examined for validity. It was hypothesised that respondents with formal diabetes education would have higher scores. Test retest method was used to examine the intra class reliability, in which the respondents were asked to retest after 3 months. A total of 62 respondents (20 had received and 42 never received formal diabetes education) completed the test. Both groups with and without formal diabetes education were not significantly different in age (30.0 ± 8.0 ; 30.1 ± 8.2 , $p=0.974$) and educational background. Respondents with formal diabetes education scored significantly higher than respondents without formal diabetes education (94.6 ± 4.1 ; 87.9 ± 6.8 , $p < 0.001$). Mean scores of the test during baseline were not significantly different with the mean scores during retest (90.1 ± 6.8 ; 89.8 ± 6.8 , $p=0.803$) and the test retest scores were positively associated with each other ($r=0.479$, $p < 0.001$). The association remained the same when the respondents' tests were evaluated separately for the groups with, and without formal diabetes education. The diabetes prevention knowledge test was suitable, valid and reliable for the assessment of the knowledge of the subjects in the intervention study.

A05 The signs of malnutrition were observed among Aboriginal Children through anthropometric measurements

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Malnutrition (or “undernutrition” in this particular context) is clinically defined as having inadequate intake of energy, protein, micronutrients, and frequent infections or diseases. Thus, malnutrition can result from complicated interactions among dietary intakes, health, and social-economic environments; in turn, it affects the quality of life and so the development of a community. An investigation to assess the nutritional status using anthropometric measurements were carried out for a group of 30 aboriginal children, aged 4 to 7 years old, residing in an Orang Asli settlement in Gua Musang, Kelantan. The children could be divided into 15 girls and 15 boys. 70% of the children’s families did not report their household incomes, while those who reported had incomes ranging from RM 80 to RM 350 per family. Based on the CDC Growth Chart 2000, 13.33% of the female respondents, and 66.67% of the male respondents were below the 3rd percentile of weight-for-age table, indicating underweight or wasting that might result from recent malnutrition. For height-for-age, 33.33% of the girls, and 73.33% of the boys were below the 3rd percentile category, indicating stunting or shortness that might result from long-term malnutrition. Referring to Frisancho’s normative data (1974), the triceps-skinfold-for-age revealed an average or above-the-average caloric reserve from majority (96.67%) of the respondents. By using Frisancho’s standards (1990) for corrected muscle area, the sign of muscle wasting was indicated in 96.67% of the children. This study revealed at least 30% of the aboriginal children in the surveyed area were malnourished. The loss of protein reserve was especially obvious. Despite undernutrition, BMIs could be high among the stunted children; triceps skinfold thickness could also maintain when energy intake shifts to fat reserves rather than protein storage (muscle mass) due to recent energy replenishment after a prolonged period of malnutrition.

A06 A follow-up study of nutrition education programme in the healthy school campaign among Malay schoolchildren in Kuala Lumpur and Selangor

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The purpose of this study was to evaluate the nutrition education programme in the healthy school campaign. This study involved 365 children aged 9 and 11 years old from 9 primary schools in Kuala Lumpur and Selangor. Changes in nutrition knowledge, attitude and practice were measured in this study and were compared with the baseline data (pre intervention study). This follow up study was done one year after implementation of the nutrition education programme. The results of this study showed that nutrition knowledge of the study subjects increased significantly ($p < 0.05$) ($75 \pm 19\%$) as compared to the baseline data ($63 \pm 16\%$). The breakfast habits increased during school days and the intake of high sugar food decreased significantly among the study subjects when compared to the baseline data. Fast food selection and consumption of carbonated drinks were decreased significantly in this study. This study also showed that milk and plain water preference were increased significantly as compared to the baseline data. In conclusion, nutrition education programme in this healthy school campaign was succeeding in increasing nutrition knowledge, attitude and practice of the study subjects.

A07 Household socioeconomic status, nutritional status and intelligent quotient (IQ) among Orang Asli children 3-8 years old in Sepang District and Carey Island, Banting

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Food security has been shown to relate to health and nutritional status. Food insecurity can affect health either directly or indirectly through a physiological mechanism related to nutrition. Risk factors for food insecurity include any factor that affects household resources and the proportion of those resources available for food acquisition. Health and nutritional status, hunger level, psychosocial support, socioeconomic status have been reported to affect cognitive development of children. The objective of this study is to determine the effect of household socioeconomic status and nutritional status on intelligent quotient (IQ) of Orang Asli children aged 3-8 years old in Sepang District and Carey Island, Banting.

The design of this study was cross-sectional. The sample consisted of 127 children of Temuan and Mah Meri sub-ethnic groups of Orang Asli. Mothers were interviewed using a structured questionnaire to gather information on household socioeconomic status. Radimer/Cornell Hunger and Food Insecurity Instrument was used to classify the households into four levels of food security. Three days' 24-hour diet recall were used to assess the children's dietary intakes. Children's weights and heights were measured and converted into Z-scores to classify the children into stunted, wasted and underweight categories. McCarthy's Scale of Children Abilities (MSCA) instrument was used to determine Intelligent Quotient (IQ) of children. Descriptive and statistical analyses were done using SPSS 12.0. ANOVA procedure was conducted to compare the differences in IQ of children according to household socioeconomic and nutritional status. Analysis of covariance (ANCOVA) was used to examine the effect of nutritional status on IQ of children independent of household socioeconomic status.

Half of the Orang Asli children (50.4%) were from poor families with 21.2% experiencing child hunger, while 39.7% were individual food insecure, 28.1% household food insecure and 11% household secure. According to income per capita, 33.9% were poor and 25.2% were hardcore poor. The mean of household income was 638.27±480.86 and the mean income per capita was 120.06±90.49. The mean household size and number of children were 5.03±1.96 and 3.6±1.8, respectively. Most of the mothers (68.5%) and fathers (77.2%) finished primary school, however, 18.1% mothers and 22.0% fathers had never gone to school. About 76.7% mothers were housewives and 23.3% were working. The mean of food expenditure per month was RM211±134.21. The prevalence for significantly stunted, wasting and underweight were 43.3%, 7.1% and 39.4%, respectively. The mean diet diversity for the children was 7.35±1.90 with most of them having moderate food diversity score (66.1%). For the IQ of children, the mean was 77.77±19.17 with most of them having weak performance in IQ (57.5%). Based on ANOVA, there are mean differences in IQ scores according to the weight-age and height-age categories and household food expenditure. After having controlled for the household socioeconomic variables, there are mean differences in IQ scores according to the weight-age and height-age categories.

A08 Awareness of healthy diet among four selected rural villages in Kuala Nerang, Kedah

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The prevalence of chronic diseases in Malaysia is on the rise, in both urban and rural areas. This is due to aging population and lifestyle behaviour changes. Health promotion and health education on healthy lifestyle focusing on balanced diet should be advocated to everyone. The aim of this study is to describe the rural settlers' attitude towards dietary intake and food expenditure. This is a cross sectional survey conducted among four selected rural villages in Kuala Nerang, Kedah from 7th June to 19th June 2004. Study population consists of 200 households from three Malay traditional villages and one Siamese village. Data was collected through face to face interview using standard structured questionnaire. Respondents comprise of 49.7 % males and 50.3 % females. The majority are Malays which contributes about 70.8% of the total respondent, followed by Siamese (28%) and Chinese 1.2%. A large proportion of the respondents (70%) only received primary education or no education at all. Poor awareness regarding well balanced diet was identified among the respondents. It is a concern especially in the Siamese village whereby 72% have minimal knowledge on well balanced diet. Among those who have good knowledge of well balanced diet, less than 50% agreed that diet is a contributing factor towards developing chronic diseases. The awareness and knowledge on healthy diet among the respondents in all four selected villagers were found to be poor, more so among the respondents from the Siamese village. Further health education and promotion should be targeted to this population.

A09 Development of a booklet on nutrition and healthy ageing

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Development of a healthy ageing booklet is an important effort to prevent the increasing incidence of diseases caused by malnutrition among elderly and to improve their quality of life. Therefore, this study was conducted to develop a booklet on nutrition and healthy ageing and to evaluate the level of acceptance among health staff and older people. This study was divided into two phases. The first phase is the development of the booklet and the second phase is the evaluation of the booklet. During the first phase (August to December 2004), a booklet on nutrition and healthy ageing was developed based on ten guidelines. These guidelines were (1) Consume a variety of foods, (2) Keep active to maintain muscle strength and healthy body weight, (3) Consume at least 3 meals every day, (4) Eat plenty of vegetables and fruits, (5) Fullfill your calcium needs, (6) Choose foods low in fat and cholesterol, (7) Use salt and salty foods sparingly, (8) Decrease sugar intake and sweet foods, (9) Drink a lot of water (>8 glasses) and (10) Prepare and store foods safely and correctly. In the second phase, a cross sectional survey was carried out on 26 non-institutional elderly people aged 60 and above with mean age of 68.915.65 and 10 health staff. This survey was held at two clinics i.e. Kuala Pilah and Sungai Besar that organised Klinik Warga Emas. The inclusion criteria for elderly subjects were an ability to read, good mental health status, no difficulties in hearing and seeing. The subjects were asked to read the booklet before a set of questionnaires was given. The questionnaire contained information on demographic data and the evaluation on understanding, graphic and format of the booklet. The findings showed that 90% of health staff and 65.4% of elderly understood the booklets' contents and the aspect that made them understand the contents

was the usage of words. The majority of elderly subjects (76.9%) said that the pictures were interesting while 15.4% said very interesting. The elderly subjects preferred bright colours while health staff preferred a combination of bright and soft colours. The subjects' acceptance towards the booklet was satisfactory with 88.9% who perceived the contents to be useful as eating guidance for the elderly. The booklet can be used by health professionals, charity organisations, non-government organisations, caregivers and elderly people as a nutrition education material.

A10 Body mass index, fat percentage and blood pressure of Malay and Chinese students

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The purpose of this study was to investigate the alterations in blood pressure and fat percentage in relation to obesity in young female Malaysians. Malay and Chinese female students (n=45, 20.66±1.43 years, 157.33 ± 5.48 cm, 53.30±9.75 kg) from a university in the northeast of peninsular Malaysia were enrolled in this study. Weight and height of the students were taken using a Seca weighing scale and a wooden stadiometer mounted to the wall, respectively. Blood pressure was measured by manual sphygmomanometer. Body mass index (kg/m²) was calculated and body fat percentage derived using the formula by Yap *et al.* (2000). Students were divided into underweight, normal, overweight and obese according to the recent proposed classification of body mass index for Asians. A 2-way (Ethnicity * Obesity) MANOVA was used to determine the differences in blood pressure and percent fat among obesity groups by ethnicity. There was a significant difference in body fat percentage (37.98±5.19 vs. 30.06±1.73, p<0.001) and systolic blood pressure (117.00±11.71 mmHg vs. 103.05±8.27 mmHg, p=0.014) in the obese as compared to the normal students. The underweight females (26.34±0.65%) had less fat than their normal and obese counterparts (p<0.001 each). Malay students had a significantly higher fat percentage (33.86±4.97 vs. 28.78±2.60, p=0.001, eta²=0.244) and systolic blood pressure (113.20±9.50 mmHg vs 103.04±8.17 mmHg, p=0.021, eta²=0.135) as compared to their Chinese counterparts. Higher body mass index has a significant effect on body fat percentage and blood pressure in both ethnic groups. Ethnic differences in body fat percentage and blood pressure were observed.

A11 A longitudinal study on the anthropometric measurements and functional status among rural elderly Malays in Sabak Bernam and Kuala Pilah

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This study was conducted among elderly Malays aged 60 years and above in rural areas of Sabak Bernam and Kuala Pilah to determine the changes in anthropometric measurements and functional status and their correlation with mortality after a period of three years (2000 to 2003). Out of 529 subjects initially studied in the year 2000, 473 subjects were still alive in the year 2003, 56 subjects were missing. However, only 289 subjects were able to be followed up and measured for anthropometry and functional status. Anthropometric measurements (body weight, height, arm span,

middle upper arm circumference (MUAC), four sites of skinfold thickness and waist and hip circumference) were measured to obtain body mass index (BMI), percentage of body fat, lean body mass (LBM) and waist-to-hip ratio (WHR). The evaluation of functional status included questionnaire of Instrumental Activities of Daily Living (IADL) and physical ability test. This study showed a significant increment in BMI of height ($0.32 \pm 2.09 \text{ kg/m}^2$) and triceps skinfold thickness ($1.93 \pm 6.16 \text{ mm}$) and a significant decrement in the mean of height ($-1.47 \pm 2.94 \text{ cm}$), MUAC ($-0.92 \pm 2.90 \text{ cm}$), waist circumference ($-2.00 \pm 10.08 \text{ cm}$), hip circumference ($-1.92 \pm 5.76 \text{ cm}$) and suprailiac skinfold thickness ($-1.49 \pm 6.11 \text{ mm}$) ($p < 0.05$ for all parameters). Elderly subjects who had a lower biceps, triceps, suprailiac and percentage of body fat at the baseline study had a higher risk of mortality compared to subjects with a higher biceps, suprailiac and percentage of body fat ($p < 0.05$ for all parameters). Among the subjects who were still alive during the follow up, there was an improvement in flexibility test but deterioration in mobility, lock and key test and cognitive status. It was found that percent of subjects who were unable to do most of the components of instrumental activities of daily living was higher in the cohort who had died earlier compared to the survivor group ($p < 0.05$). In conclusion, this study had found some changes in body composition, longitudinally. It appeared that lower biceps, triceps, suprailiac, percentage of body fat and inability to perform IADL were associated with mortality risk.

A12 Nutritional status among a sample of Chinese elderly aged 60 years and above in Bidor, Perak

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A cross-sectional study was carried out to determine the nutritional status of a sample of 100 elderly people aged 60 years and above in Bidor, Perak. A set of questionnaire form was used to obtain information related to socio-demography, economic status and health conditions. Food intakes were recorded using two days' 24-hour dietary recall. Anthropometric measurements including weight, height, arm span, waist and hip circumferences, mid-upper arm circumference (MUAC), skinfold thickness (SFT) of triceps, biceps, subscapular and suprailiac and calf circumference were measured and values for body mass index (BMI), waist-hip ratio (WHR), percentage of body fat were calculated. The handgrip strength was also measured using a hand dynamometer. About 35% and 10% of the respondents were classified as overweight and obese, respectively. All anthropometric measurements tend to decrease with increasing age. Similar trend was observed for BMI and percentage of body fat, but not for WHR. Reduction in muscle size was associated with lower handgrip strength. Based on the MUAC as an indicator, majority of the respondents (92.9%) were not undernourished. About 75% of the respondents were considered at high risk for chronic diseases based on WHR as an indicator. The results showed that the mean intakes of protein, iron, thiamin and niacin were above two-thirds of the Malaysian recommended dietary allowance (RDA) for male respondents. Whereas, the mean intakes of energy, protein, iron, thiamin, vitamin A and vitamin C of female respondents were above two-thirds of Malaysian RDA for the females. The independent t-test showed significant differences for weight ($t=3.793$, $p < 0.05$), height ($t=10.817$, $p < 0.05$), arm span ($t=12.964$, $p < 0.05$), hip circumference ($t=-1.989$, $p < 0.05$), WHR ($t=2.618$, $p < 0.05$), mid-upper arm circumference ($t=4.320$, $p < 0.05$), SFT of biceps ($t=-11.085$, $p < 0.05$), subscapular ($t=-7.142$, $p < 0.05$), suprailiac ($t=-2.146$, $p < 0.05$) and calf circumference ($t=2.371$, $p < 0.05$) between gender. There were significant differences for energy ($t=3.324$, $p < 0.05$), protein ($t=7.996$, $p < 0.05$), thiamin ($t=-1.081$, $p < 0.05$), riboflavin ($t=-5.127$, $p < 0.05$), niacin ($t=5.567$, $p < 0.05$), vitamin A ($t=-7.594$, $p < 0.05$) and vitamin C ($t=-10.272$, $p < 0.05$) between gender. Using the Pearson correlation test, there was no significant association of nutrient intakes with BMI. However, there were significant associations of protein ($r=0.254$, $p < 0.05$), iron ($r=0.284$, $p < 0.01$), thiamin ($r=-0.371$, $p < 0.01$), vitamin A

($r=-0.202$, $p<0.05$) and vitamin C ($r=-0.329$, $p<0.01$) with WHR and protein ($r=0.229$, $p<0.05$), vitamin A ($r=-0.252$, $p<0.05$) and vitamin C ($r=-0.282$, $p<0.01$) with MUAC. In conclusion, most of the anthropometric measurements and nutrient intakes indicated that majority of the respondents have good nutritional status. However, overweight and obesity are still quite prevalent. Therefore, targeted promotive and preventive interventions are needed to improve the dietary patterns and lifestyle habits among the elderly, thus reducing the risk and delaying the onset of chronic diseases and other health conditions.

A13 Relationship between nutritional status and blood pressure among primary school children in Kuala Lumpur

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The present retrospective study was conducted to determine the relationship between nutritional status and blood pressure among primary school children in Kuala Lumpur. A total of 307 students aged 9 to 11 years which comprised of Malays (58.4%), Chinese (31.2%) and Indians (10.4%), were recruited from nine primary schools in three different zones in Kuala Lumpur. Social demography forms were used to collect information on demographic data, socioeconomic status and birth weight, while a one day 24-hour dietary recall was used to evaluate nutrient intakes. Blood pressure was measured using automated blood pressure monitor (Omron T5 with intellisensetm). Anthropometric measurement such as body weight and height were also carried out. Mean birth weight of boys and girls were 3.084 ± 0.492 kg and 3.044 ± 0.526 kg respectively. About 9.9% of the boys and 13.3% girls had low birth weight (<2500 g). There was no significant difference in mean systolic blood pressure between boys (105.9 ± 12.0 mm Hg) and girls (106.6 ± 12.7 mm Hg), while mean diastolic blood pressure for both sexes were the same (65.7 mm Hg). Based on the classification of National High Blood Pressure Education Program (NHBPEP) Working Group on High Blood Pressure in Children and Adolescents (2004), about 14.8% of boys and 17.6% girls in this study had high blood pressure. There was no significant association between all nutrient intake with systolic and diastolic blood pressure ($p>0.05$), except for protein intake and diastolic blood pressure ($\beta = -0.232$, $P=0.014$). A significant positive correlation was found between socioeconomic status and systolic blood pressure ($r=0.113$, $p=0.049$). The result also revealed that subjects with low birth weight and high BMI had the highest mean systolic blood pressure (118.5 ± 12.9 mm Hg). Body weight, height and BMI had strong and significant positive association with systolic and diastolic blood pressure ($P<0.0001$). After adjusting for current BMI, systolic blood pressure was inversely and significantly associated with birth weight ($P=0.007$). For every 1 kg decrease of birth weight, systolic blood pressure increased by 3.227 mm Hg. There was no relation between birth weight and diastolic blood pressure. Overall, there was an inverse and significant relationship between systolic blood pressure and birth weight in children age 9 to 11, and the effect is amplified by high current weight.

A14 Anthropometric and body composition changes during high altitude expedition (Mount Everest)

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Mount Everest is the highest mountain in the world with the height of 8,848 m. High altitude exposure has great impact on human physiology. However, little is known about it. The purpose of this cross sectional study was to measure the anthropometric and body composition changes among the

young adult climbers during Mount Everest Expedition 2004 (*UiTM: Demi Negara ke Everest*). A total of twelve young adult male subjects were recruited after obtaining an informed-consent form from all the subjects. Anthropometrical and body composition were measured according to the standard procedures, before departing, during ascending (high altitude exposure) and again after the return to low altitude. All data was analysed using SPSS and are presented as mean \pm SEM. The mean age of the subjects was 23.17 ± 0.27 . The present study shows that body weight decreased progressively but whether it is due to inadequate diet, hypoxia, malabsorption or other extreme environmental factors is unidentified. High altitude and its effects to humans are not clearly understood; therefore further research on high altitude exposure is very much needed to provide better understanding of nutritional acclimatisation at higher altitude.

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A15 Nutritional status of female students at Universiti Putra Malaysia, Serdang, Selangor

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The main objective of this study was to determine the nutritional status of female students at Universiti Putra Malaysia. A total of 160 respondents which comprised of 80 Malays and 80 Chinese were randomly selected from four residential colleges. Body mass index (BMI), waist circumference (WC), waist-to-hip ratio (WHR) and body fat percentage were obtained from each respondent. The nutrient intakes were evaluated using the 24-hour dietary recall. Food frequency questionnaires (FFQ) were used to determine the food consumption pattern. Results showed that the mean BMI, WC, WHR and percent body fat of Malay students were 21.33 ± 3.28 , 70.96 ± 7.59 cm, 0.75 ± 0.04 and 27.91 ± 5.53 % respectively; however, the mean BMI, WC, WHR and percent body fat of Chinese students were 20.30 ± 2.37 , 70.26 ± 7.72 cm, 0.76 ± 0.04 and 26.50 ± 4.26 % respectively. About 81.3% of the Malay students and 75 % of the Chinese students consumed less than the Malaysian Recommended Dietary Allowances (RDA) in terms of energy intake. Other nutrients such as vitamin A, thiamine, riboflavin, niacin, vitamin C, calcium and iron were below 2/3 of Malaysian RDA. These findings revealed that the main sources of calories in the diet were white rice and fish among Malay students; however, the main sources of calories in the diet were white rice, fried *koey teow*, mee soup and bun among Chinese students. These foods were found to be frequently consumed by the respondents daily. The bivariate correlation test shows that protein ($p = 0.031$, $r = 0.242$), niacin ($p = 0.048$, $r = 0.222$) and vitamin C ($p = 0.024$, $r = 0.252$) were significantly related to WHR and there was significant relationship between vegetarian diet and BMI with $p = 0.016$, $r = -0.269$ among the Malay students. In contrast, among the Chinese students, significant relationship was found between total family income and WHR ($p = 0.049$, $r = 0.221$). This study shows that the nutrient intake of female students was not satisfactory due to the high percentage of students consuming less than the Malaysian RDA. It is recommended that all the university students should be educated on nutrition and healthy lifestyle to improve their nutritional status.

A16 Prevalence of overweight and obesity among male adolescents in Kuantan, Pahang Darul Makmur

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A cross-sectional study was carried out to determine the prevalence of overweight and obese male adolescents among the 3 major ethnic groups in Kuantan, Pahang Darul Makmur. By a multistage sampling, a total of 611 male adolescents aged 13 and 14 years, attending 3 selected secondary schools in Kuantan, were screened by measuring their weight and height, and determining their Body Mass Index (BMI) using International Obesity Task Force's cut off point by sex (Cole *et al.*, 2000). With regards to age distribution, 336(55.0%) and 275(45.0%) of the respondents were 13 and 14 years old respectively and their mean age was 13.45±0.498 years; 52.4% were Malays, 41.4% Chinese, 5.6% Indians and 0.6% were other races. The mean value for BMI was 20.0±4.6 kg/m² and the prevalence of overweight and obesity were 16.7% and 7.9% respectively. The overall prevalence of 24.6% for overweight and obesity is almost 2.5 times higher than the prevalence of 9.6% in an earlier study by Kasmini *et al.* (1997). When comparing across the three major ethnic groups, Indians have the highest percentage of overweight and obesity (32.3%), followed by the Chinese (24.5%) and Malays (23.8%). However, there is no significant association between ethnicity and BMI categories ($\chi^2=8.270$, $p=0.082$). Intervention programs may help adolescents to know better about their health by providing appropriate and worthy information on healthy body weight status and consequences of obesity. Moreover, multivariate studies should be conducted to determine the major factors that contribute to the problem of overweight and obesity.

A17 Prevalence of overweight and obesity among female adolescents in Kuantan, Pahang

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By a multistage sampling, this cross sectional study was conducted to determine the prevalence of overweight and obesity among female adolescents in Kuantan, Pahang. Of a total 1224 Form 1 and Form 2 female students in three selected secondary schools in Kuantan, Pahang, 792 were screened using a self-administered health screening form and anthropometric measurements of height and weight. The body weight status of the female adolescents were determined based on International Obesity Task Force (IOTF) Body Mass Index (BMI) cut off points for overweight and obesity by sex from 5 to 18 years (Cole *et al.*, 2000). Of the 792 screened, 409 (51.6%) were Malays, 335 (42.3%) Chinese, 43 (5.4%) Indians, and 5 (0.6%) were from other ethnic groups. Their mean age was 13.5±0.5 years. Almost all subjects (90.8%) had achieved pubertal status and their mean pubertal age was 11.0±3.6 years. The prevalence of overweight and obesity in this study were 13.4% and 5.7% respectively. This overall prevalence of 19.1% (almost one in every five female students) is higher when compared to the prevalence in a previous study by Kasmini *et al.* (1997) whereby 8.0% of the female adolescents in her study were either overweight or obese. When comparing across three major ethnic groups, Malays have the highest percentage of overweight and obesity (24.0%), followed by Indians (23.3%) and Chinese (12.4%) ($\chi^2=19.511$; $p<0.01$). Also, most of the overweight female adolescents were more likely to have achieved their pubertal status compared to the other subjects ($\chi^2=9.866$; $p<0.01$). Future intervention and prevention programmes should take into consideration the differences in the prevalence with regards to ethnicity and pubertal status.

A18 A needs assessment study: Maternal perception and knowledge on health and nutrition of orang asli children in Sepang district and Carey island, Selangor

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Focus group discussion is one of the qualitative methods in the health research field which is gaining popularity. In this study, focus group discussion was conducted among the Orang Asli (aborigines) women as a tool of needs assessment. A total of 8 focus group discussions were carried out among women of childbearing age. Four of the groups represented 6 Temuan villages (n=40) in Sepang District while four others represented 4 Mah Meri villages (n=31) in Carey Island. Their age ranged from 20 to 50 years old. They were mostly illiterate or with a primary level of education. The women were interviewed in terms of their perception on child health and factors which contribute to good health; perception on good (nutritious) and bad (less nutritious) foods and their effects on child health; knowledge on food and/nutrients, in relation to their general functions on health, their effects on growth and brain development of the children as well as diseases. All Mah Meri and Temuan groups defined 'healthy' and 'unhealthy' as primarily behavioural symptoms, in which unhealthy child does not exhibit his usual behaviours such as playing, eating and sleeping well. All of the groups cited cleanliness of the child, food and home environment as important contributors to child health. Fruits and vegetables were generally considered as 'good' foods while sweets were 'bad' foods. Meat, eggs, milk and fish were also considered as 'good' foods by some of the women. They also agreed that nutritious foods make children healthy. Three Mah Meri groups and only one Temuan group cited body growth and brain development as specific outcomes of giving nutritious foods. Majority of the Mah Meri women were unable to relate nutrients to food but the Temuan groups were able to relate food with some nutrients. All of the groups were unable to relate nutrients to their specific functions. Two Mah Meri and all Temuan groups reported that sugar and salt can cause diabetes mellitus and hypertension, respectively. As a complement to the assessment of the Orang Asli children's nutritional status, which was prior to this study, findings from this focus group discussion reinforce the needs of implementing health and nutritional intervention among the Orang Asli community.

A19 Anthropometric measurements, knowledge, attitude and practices of pregnant women in urban areas

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This study was conducted to determine the level of knowledge, attitude, practices and anthropometric measurements of pregnant women residing in urban areas. The area selected was Sg. Besi Camp, Kuala Lumpur. Seventy pregnant women who obtained their antenatal check-up at Pusat Perubatan Angkatan Tentera, Kem Sg. Besi were selected as subjects. Data collection had been done through personal interviews using the pretested questionnaire. All data were analysed using SPSS version 12.0 computer program and Diet 4 was used to analyse nutritional intake. The result shows more than 50% of the respondents had total household income of more than RM 1500. 49 % had a formal education up to higher secondary level. The scores for nutritional knowledge and practices of the respondents are good with the scores of 52.9% and 85.7% respectively. Meanwhile, mean

score for attitude is moderate with score of 57.1%. The intake of protein, riboflavin, niacin, vitamin A and vitamin C of respondents when compared to Malaysian RDA was >100%. Energy intake of 18.6% of respondents was between 80-100% of RDA (good) and 12.9% of respondents have adequate intake (RDA 66-79%) of energy. More than half of respondents (54.3%) have low ferum intake which is less than 50% of RDA. About 15 respondents at the first 20 weeks of pregnancy and 38 respondents from 21 weeks to 40 weeks gained more weight than the value recommended by Ministry of Health. Only 11 respondents successfully achieved weight gain according to Institute of Medicine (1990) recommendation. Result from Pearson Correlation showed that there was no significant relationship between knowledge, attitude and practices with weight gain ($p > 0.05$). There is also no significant relationship between socioeconomic factors (age, income, number of years of education) with nutrient intake (energy, protein, vitamin A, vitamin C, calcium and ferum) of respondents. There is also no significant relationship between pre-pregnancy BMI with weight gain. In conclusion, the daily intake of important nutrients is still below or less than the recommendation for majority of respondents although their nutritional knowledge is high. These women need to follow the advice of Ministry of Health in order to have balanced dietary intake during pregnancy.

A20 Nutritional status and body composition of national development netball players

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Nutrition and body composition play major roles in improving sports performance. The objective of this study was to determine the nutritional status and body composition of the national development netball players. This study was conducted at Bukit Jalil Sports School and fifteen players aged between 13 and 17 years participated. Anthropometry measurements taken were weight and height, from which BMI was determined. Body composition was measured using Bodystat 1500 MDD. The players kept a 3-day food diary to record their dietary intake. Nutrient content was estimated using Nutrient Composition of Malaysian Food (Tee *et al.*, 1997). The results indicated that the netball players' mean body weight and height were 64.7 ± 15.3 kg and 1.71 ± 0.08 m respectively with the mean BMI 22.2 ± 2.36 . The mean percent body fat was 20.66 ± 3.43 % and lean body mass was 51.24 ± 4.1 kg. Average energy intake was recorded at 2762.97 ± 1511.87 kcal/day and 58.33% of the total energy was derived from carbohydrate, 19.68% from protein and 28.99% from fat. Intake of iron was slightly lower than the Malaysian RDA. This study found that the young female players were in good nutritional status in terms of BMI and body composition. The intake of carbohydrate and fat were sufficient, however, the intake of protein was high (2.2 g/kg/day). Proper nutrition combined with a good body composition could help young female athletes maximise their health and sports performance, thus dietary guidelines are needed for Malaysian female athletes at various ages competing at various levels.

A21 Nutritional status and physical activity levels among primary school children in Georgetown, Penang

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This study was conducted to assess the nutritional status and physical activity levels among primary school children in Georgetown, Penang. A stratified sampling was carried out to select 50 male and 50 female primary school children aged between 9.0 and 10.9 years to participate in this study. A set of questionnaires, SECA microtoise tape and TANITA electronic weighing scale were used to collect the anthropometric data. Nutritional status was identified based on BMI using WHO (1995) standard classification. From the study, the prevalence of underweight, overweight and obesity were 8.0%, 18.0% and 14.0% respectively. Regarding the calorie intake, 66.0% of the subjects failed to meet 2/3 of Malaysian RDA. In contrast, the protein intake was high; 96.0% of the subjects consumed more than 100% of the Malaysian RDA. Moreover, energy intake from protein (60.65±13.73 g) and fat (56.33±15.56 g) sources exceeded the Malaysian RDA. The subjects spent most of their time (1248.25±64.91 minutes) in light activities. They carried out moderately active daily tasks for about 125.85±42.58 minutes and vigorous activities for 64.60±36.71 minutes. The Spearman Correlation test showed that there were significant correlations between BMI and family size ($r=-0.214$, $p<0.05$), calorie intake ($r=0.397$, $p<0.01$), carbohydrate intake ($r=0.199$, $p<0.05$), protein intake ($r=0.340$, $p<0.01$) and fat intake ($r=0.416$, $p<0.01$). The study also showed that there was significant correlation between BMI and time spent in physical activities. BMI was found to be directly proportional to the time spent in light activities ($r=0.542$, $p<0.01$) but inversely proportional to the time spent in both moderate ($r=-0.223$, $p<0.05$) and vigorous activities ($r=-0.586$, $p<0.01$). This study shows that there is significant correlation between BMI and calorie intake, nutrient intake as well as time spent in physical activities.

A22 Energy expenditure and physical activity of Malaysian adolescents

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Physical activity has an impact on energy expenditure, physical fitness and positive health outcome. A sedentary lifestyle, often adopted during adolescence and continued in adulthood, is a major concern for public health. To better understand the daily energy expenditure of Malaysian adolescents, a stratified cross-sectional study to compare the physical activity level of 12-18 year old secondary school children has been performed. Subjects (211 boys and 270 girls) kept a record of their activities in time-motion record forms on two weekdays and one weekend day. Activities were grouped according to five intensity levels on the basis of physical activity ratio (PAR) as suggested by Torun *et al.* (1996). Physical activity level (PAL) of each subject was then calculated from the average of time spent in activities of varying intensity on each day using factorial method. Total energy expenditure (TEE) was obtained from PAL and measured basal metabolic rate (BMR) of each child. PAL for boys in the 12 - 14 years and 15 - 18 years age group was 1.50±0.10 and 1.54±0.11, respectively; and amongst girls, 1.46±0.16 and 1.49±0.07, respectively. Average energy expenditure was 8.93±1.19 MJ/day and 9.42±1.21 MJ/day for boys in the 12 - 14 years and 15 - 18 years age

group, respectively; and amongst girls, 6.83 ± 1.23 MJ/day and 6.89 ± 0.87 MJ/day, respectively. The activity level of rural children does not differ from their urban peers since both groups attend standardised formal education for almost seven hours a day. It may be concluded that the level of habitual physical activity reported in this study reflects sedentary lifestyles according to FAO/WHO/UNU (2004) classification.

A23 Energy balance and health status of type 2 diabetes mellitus Chinese outpatients in Hospital Pulau Pinang

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The research was carried out to study the energy balance and health status among Type 2 Diabetes Mellitus outpatients in Outpatient Clinic, Hospital Pulau Pinang. This case study involved 70 male and female patients aged between 35 and 82 years. The respondents' diet was recorded for two days using the 24-hour Dietary Recall method and the nutrient composition was determined by using the Diet 4 software. The energy and nutrient intake were then compared with recommendations of the Malaysian Diabetes Organization (1993). Energy expenditure was also recorded for two days by using 24-hour Activity Measurement method. The anthropometric measurements, such as body weight, was determined by using Tanita weighing machine whereas height was measured by Bodymeter. The respondents' blood glucose level and occurrences of complications were obtained from patients' health records. All data were recorded in the questionnaire during the interview session. There were 41.4% male and 58.6% female respondents interviewed. The mean age of all respondents was 60.29 ± 9.48 years. The duration of diabetes suffered by the patients was 10.30 ± 8.60 years and the mean blood glucose level was 8.94 ± 3.23 mmol/L. The mean of Body Mass Index for all patients was 24.53 ± 4.03 kg/m². Furthermore, the mean total household income was RM 1656.43 ± 936.57 per month with 40.0% of the respondents retired or not working. From the dietary study, the mean energy intake of males was 1651.03 ± 425.41 kcal/day while the mean energy intake of females was lower than males, at 1343.61 ± 331.23 kcal/day. This showed that the energy intake for both males and females was lower than the recommendation of Malaysian Diabetes Organization (1993). The mean energy expenditure was 1691.79 ± 259.29 kcal/day. The energy balance was negative among the respondents, with the mean of -220.81 ± 377.05 kcal/day. There were 27.1% respondents at the positive energy balance while 72.9% belonged to negative energy balance group. The result of the Pearson Correlation test showed no significant association between socioeconomic status (total education and total income) and blood glucose level among the patients. The Pearson Correlation test also indicated no significant association between Body Mass Index and patients' blood glucose level. The Chi Square test showed no significant difference between energy balance and blood glucose level among respondents. The Chi Square test also showed no significant difference between duration of disease and the occurrences of complications among the patients. In conclusion, this study showed that the health status of the diabetic patients was less than satisfactory. Therefore it should be improved to achieve better health outcome.

A24 Relationship between nutritional status and cognitive skills performance of primary Chinese school children in Kuala Lumpur

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Protein-energy malnutrition (PEM) and micronutrient deficiencies which occur during infancy and childhood may contribute to physical growth impairment and decreased intelligence. This study was conducted to determine the relationship between nutritional status and cognitive skills performance of primary Chinese school children in Kuala Lumpur. A cross-sectional study was conducted among 223 Chinese children (119 boys and 104 girls) aged between 9 to 12 years old. Anthropometric measurements taken were weight, height and mid-upper arm circumference. 24-hour diet recall method was used to determine dietary intake of subjects. Cognitive performance of children was assessed using a validated Wechsler Intelligent Scale for Children (WISC-3rd edition 1991). Two subtests were run, which was coding and digit span. Questionnaires were used to obtain socio-demographic data from parents. Based on the National Center for Health Statistic (NCHS/WHO 1983), the prevalence of stunting and underweight was 4.9% and 4.0% respectively while 15.7% of children had low protein-energy reserve (Frisancho 1981). Mean energy and protein intake for boys (2021±531 kcal/day and 74±24 g) achieved 91.4% and 160.9% of the recommended nutrient intake for Malaysia (RNI 2005). Mean energy and protein intake for girls (1812±393 kcal/day and 66±25 g) achieved 90.1% and 143.5% of the recommended nutrient intake for Malaysia (RNI 2005). Mean cognitive skills' score for both subtests were 28.98 ± 4.84, which categorised as higher achiever. Pearson's correlation tests showed that there was no significant correlation between index height-for-age and nutrient intake with WISC subtests total score but there was significant correlation between index weight-for-age and birth weight with WISC subtests total score ($r = -0.149$, $p < 0.05$; $r = -0.150$, $p < 0.05$). ANOVA tests showed that there were significant differences between having computers (with internet) and the WISC subtests total score ($F = 4.890$, $p < 0.01$). Regression tests showed that only father's education contributed to digit span's score. This study showed the importance of good nutrition, healthy birth weight, environmental condition and optimal stimulation in influencing the physical and cognitive development and growth of these children.

A25 Relationship between the level of physical activity and indicators of obesity among a sample of university students

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The objective of this cross-sectional study was to determine the relationship between level of physical activity and selected indicators of obesity among a sample of students at Universiti Putra Malaysia (UPM). The respondents who fulfilled the inclusion criteria were recruited, consisting of 36 Malays and 44 Chinese. About 53% were females and 47.5% were males. Assessment of physical activity was carried out using a three-day physical activity record, physical activity questionnaire and a pedometer (Omron Model HJ-102). The anthropometric measurements were taken using appropriate equipments and standard procedures. The mean height and weight of the respondents were 163.1±7.92 kg and 59.0±10.1 cm respectively. The mean body mass index (BMI), waist circumference (WC) and hip circumference (HC) were 22.17±3.41 kg/m², 72.3±7.7 cm and 93.6±5.6 cm, respectively. A total of 11.2 and 5.0% of the respondents were overweight and obese, respectively.

There were a higher proportion of males (18.4%) who were overweight compared to the females (4.8%). The prevalence of overweight (16.7% vs 6.8%) and obesity (8.3% vs 2.3%) were higher among the Malays compared to the Chinese. The mean steps count for a weekday and a weekend day were 12,593±4,934 and 12,015±9,112 steps, respectively. Based on the steps count, majority (70%) of the respondents had adequate level (more than 10,000 steps per day) of physical activity. The proportion was higher among the males (76.4%) compared to the females (64.2%) and higher among the Malays (83%) compared to the Chinese (59.1%). Pearson correlation showed a negative correlation between steps count with the indicators of obesity (BMI, weight, WC, HC and WHR). Using the physical activity record, there was a significant difference in the PAL according to ethnicity and gender. The PAL or total energy expenditure (TEE) was higher among males (2487±418.1 kcal) and Malays (2479±459.8 kcal) compared to females (2114±512.9 kcal) and Chinese (2136±491.5 kcal). A strong inverse significant relationship was found between PAL and indicators of obesity, such as BMI ($r = -0.678$, $p < 0.01$), weight ($r = -0.862$, $p < 0.01$), WC ($r = -0.789$, $p < 0.01$), HC ($r = -0.656$, $p < 0.01$) and WHR ($r = -0.606$, $p < 0.01$). There is a need to target the group who are overweight and obese, and those who are sedentary and seldom engage in physical activity. It is recommended that any existing health promotion and health education programmes should be strengthened. This can be done by disseminating information on the importance and benefits of exercise, especially to young adults.

A26 Urine colour chart for determination of hydration status of road cyclists

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Sports nutritionists have always advised athletes to observe their urine colour each day as an index of hydration status. It is also known that urine specific gravity (USG) and urine colour are closely related. However, no studies have been carried out over a period of nine days on road cyclists exercising in hot humid conditions. Therefore, the purpose of this study was to determine if a urine colour chart could be used as a meaningful index of hydration on road cyclists during the 2003 & 2004 Le Tour de Langkawi. This study was approved by the University's Research and Ethical Committee.

The Malaysian road cyclists of the Le Tour de Langkawi consented to participate in the study. Early morning urine sample, which represented the first bladder void, and the last urine samples of the day were collected in containers and were analysed for urine colour and USG. USG was determined using a hand-held refractometer (Uricon-NE, Atago, Japan) and urine colour was determined by holding a test tube containing the urine sample next to a colour scale, in a well-lit room. This novel urine ten-colour chart, which was developed by the author, was based on observations of previous field and laboratory urine samples. Urine colour was determined by the same investigator. Temperature and relative humidity of the race day were measured at regular intervals using a sling hygrometer.

Results showed there was significant correlation between urine colour and USG in individual cyclists and in the combined urine samples. The data suggests that urine colour may be used in athletic field settings to determine hydration status. In conclusion, Urine colour chart may be utilised as a meaningful index of hydration status when measurements of urine osmolality and urine specific gravity are not possible or practical.

A27 Focus group discussion (FGD) among obese: a qualitative study

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Obesity has risen at an epidemic rate in the past 20 years. Changes in dietary habits and sedentary lifestyles are known to be associated with changes in health and increased prevalence of chronic diseases and obesity in the population. This qualitative study aimed to identify wellness and quality of life parameters as perceived by the Malaysian population. To obtain views across a range of the obese, 8 informants were selected to participate in the Focus Group Discussion (FGD). The FGD was conducted by a moderator who was responsible for ensuring the discussion met the objective. All the comments were collated and themes were grouped under nodes and tree nodes. As a result, two themes emerged regarding the reasons informants wanted to join the obesity group: for health reasons and to get support from the group members. The informants defined wellness as having good health, good blood pressure, normal glucose level, being free from heart problems, being free from controlled food intake and ease of movement. However, practising faith also became one of the themes in this discussion. The lack of environmental support is one of the obstacles for informants to obtain wellness. Furthermore from the FGD, behavioral change and optimism are the two themes for informants to maintain wellness. In conclusion, obtaining good health, getting support from family and environment, and positive thinking will help informants achieve wellness and quality of life.

A28 Depression among hospitalised geriatric patients: Prevalence and risk indicators

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The most common psychiatric condition among older persons is depression. Depression has been associated with higher mortality, and has a negative impact on the well-being and daily functioning of the hospitalised elderly patients. The aim of this study was to investigate the prevalence of depression, measured with a rating scale and to identify risk indicators of depression in the hospital. A cross sectional study was carried out among hospitalised elderly patients from Geriatric Ward 13, University Malaya Medical Centre (UMMC). Prevalence and risk indicators were assessed on 181 newly admitted subjects aged 65 years and above (83 men, 98 women; mean age = 73.38±6.2 years; range: 65 to 90 years). Depressive symptoms were measured by means of the Geriatric Depression Scale (GDS - 15). The depression was defined as a GDS score equals and above 10 (GDS = 10). The prevalence of depression was assessed to be 8.3% (n=15). Significant depression risk indicators were found for severe cognitive functioning, functional limitations, mortality, more than 3 diseases diagnosed and health problems (such as weight loss, no teeth, insomnia, unable to chew food and decreased appetite). The prevalence of depression in the hospital was higher, whichever way defined, the prevalence rates found were three to four times higher than in the community-dwelling elderly. Consequently, elderly patients who were depressed were more likely to complain of physical problems than to mention conventional depressive symptoms (such as mood changes) and might manifest depression as weight loss.

A29 Nutritional status and cognitive development among primary school children in Hulu Selangor

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The study was conducted to determine the cognitive development among Malay and Indian primary school children, and its relation to their nutritional status as determined by dietary intake and anthropometric indicators. Subjects were Standard 2 and 3 children from selected schools in Bukit Beruntung and Kuala Kubu Bharu (Malay n = 123, Indian n = 209). Dietary intakes were measured using 24 - hour diet recall method. The weights and heights were then converted into Z-scores using ANTHRO software to classify the children into stunting, wasting and underweight. McCarthy's Scale of Children Abilities (MSCA) instrument was used to assess the children's cognitive development. Among the Indians, prevalence of stunting was higher (28.7%) than wasting (19.6%), while wasting was 10.5 %. However, the prevalences were lower among the Malays, with stunting (13.8%), wasting (13.8%) and underweight (5.7%), respectively. The dietary intakes data showed that the mean energy intake of the Indian respondents only achieved 56.4 % of RDA while other nutrients were adequate except for thiamin, riboflavin, niacin and calcium. Among the Malays, the percentages of RDA for energy were 65.7%, with only niacin and calcium not reaching the recommended level. The mean General Cognitive Index (GCI) of MSCA instrument was significantly higher among the Malays than the Indians. Further analysis of covariance (ANCOVA) will be utilised to examine the effect of nutritional status on GCI independent of gender and ethnic groups.

A30 Influence of food taboos on nutritional status of Temiar women: a qualitative study

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This qualitative study was conducted to describe the influence of food taboos on the nutritional status of 26 Orang Asli women (Temiar) after delivery from Rancangan Pengumpulan Semula Orang Asli Kuala Betis, Gua Musang, Kelantan. The results from interviews, focus group discussions and observations indicated that, most of the respondents were still practising food taboos during confinement between one and two weeks. Foods that could be eaten during confinement were vegetables, tapioca, chicken, fresh fish, dried fish, anchovies and porridge. Foods that could not be eaten were mutton, beef, venison, salt, sugar, oil, chilli, food additives (monosodium glutamate) and certain types of fish (kendrap and baung). One of the key informants believed that salt should be taken by women after delivery to obtain energy. Their food was cooked by either boiling or grilling. Half of the key informants believed that tea and milk can be consumed but the other half believed that tea cannot be consumed because it can cause stomachache while milk can cause epilepsy because milk comes from cows. Husbands also had to follow food taboos together with their wives. All of the respondents chose to breastfeed their young. The accessibility and availability of food was a problem for the women thus limiting their choices of food sources. Food taboos and cultural behaviors practised by the women during their confinement did not directly affect their nutritional status. It can be concluded that the nutritional status of the women needs to be improved since most of them have insufficient nutrient intake.

A31 Nutritional status of Orang Asli women in Selangor: A comparison between 2 subethnic groups, Mahmeri and Temuan

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Orang Asli are the indigenous minority people of Peninsular Malaysia. They only constitute about 0.6% of the total population of the country (Department of Statistics, 2000). Basically they are divided into three main ethnic groups, the Negritos, Senoi and Proto Malays. The Mahmeri is a subethnic group of Senoi and Temuan is a subethnic group of Proto Malay. Not many studies have been conducted on the Mahmeri and Temuan women. The objective of the study is to determine the nutritional status of Orang Asli women of Temuan and Mahmeri and to determine the differences between these 2 subethnic groups. This study was carried out over a period of 3 months in the district of Kuala Langat and Sepang. There were 5 villages in the district of Kuala Langat and 9 villages in the district of Sepang. Mothers who gave informed consent were recruited into the study. There were 83 Temuan mothers and 99 Mahmeri mothers. Sociodemographic background, housing and environmental conditions, food security status, nutritional status and health status data were collected. Household data were obtained from questionnaires. The mean age of Temuan and Mahmeri mothers were 31.42 years and 30.46 years respectively. Most of the Temuan (47%) and Mahmeri (53.5%) mothers had primary school education. The mean number of years of school for Temuan mothers was 5.92 years and 6.56 years for Mahmeri mothers. More than 70% of Temuan and Mahmeri mothers were housewives. The mean monthly household income for Temuan mothers were RM416±266.67, whereas for Mahmeri women were RM295.26±178.41. Meanwhile, the mean number of children for Temuan mothers were 3.43 and 3.19 for Mahmeri mothers. The mean height and weight for Temuan and Mahmeri mothers were 169.47 cm and 61.65 kg, and 149.03 cm and 54.83 kg respectively. There was a significant difference in waist circumference between these 2 subethnic groups ($p < 0.001$). The body mass index and waist circumference were independent of ethnic groups. The mean intake of energy, protein, total fat, carbohydrate, dietary fibre, niacin, sodium, potassium, phosphorus and iron was higher among Mahmeri mothers than Temuan mothers. Besides that, in the analysis of diet, there was a significant difference in protein ($p < 0.023$), dietary fibre ($p < 0.004$), potassium ($p < 0.012$) and phosphorus ($p < 0.024$) between these 2 subethnic groups. There was also a significant difference in the number of servings from the dairy food group ($p < 0.003$) and the fruits group ($p < 0.002$). Furthermore there were no significant differences in food diversity between these 2 subethnic groups. Further analysis on nutritional status of women will be conducted.

A32 Weight loss practices and attitudes among working women aged between 30 and 45 years in Kuala Lumpur

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This study was carried out to assess weight loss attitudes and practices among female teachers and civil servants aged 30 - 45 years in Kuala Lumpur. Participants comprised 131 teachers and 122 civil servants. Anthropometric measurements include body weight, height and body composition; while attitudes and practices were assessed using a questionnaire. The subjects were Malay (64%), Chinese (26%) and Indian women (10%) with mean age of 38.4±4.6 years old. Mean body weight and body mass index of normal weight group were 54.3±10.4 kg and 21.9±1.7 kg/m²; while

overweight subjects were 69.0 ± 9.5 kg and 29.2 ± 3.6 kg/m², respectively. Overweight subjects (70%) were twice more likely to attempt weight loss than normal weight subjects (36%). There were no differences in weight loss attitudes and practices between normal weight and overweight subjects. Both groups of normal weight and overweight subjects engaged in healthy weight loss practices, which included increased consumption of fruits and vegetables (83% vs. 77%), decreased fat intake (70% vs. 85%), consumption of less carbohydrate foods (66% vs. 58%) and reduced amounts of food (62% vs. 56%). However, overweight subjects (20%) were more likely to use commercial weight loss products as compared to normal weight subjects (9%). Combined diet and exercise (62% vs. 50%) was perceived as the most effective method to lose weight, formula diets (54% vs. 44%) was the most desired weight loss product, and jogging (32% vs. 31%) was the most popular exercise cited by normal weight and overweight subjects, respectively. The findings of this study may be useful to health professionals in developing effective weight management programmes.

A33 Intervention study of promotion of healthy ageing among rural elderly Malays: nutritional and health practices among health professionals involving in elderly care in Sabak Bernam and Kuala Pilah

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This study was conducted to assess and observe the nutritional and health practices and nutritional knowledge in elderly care among health professionals in health clinics to enable the development of nutrition intervention packages. The study was conducted among 66 health professionals (24.2 % men and 75.8% women) (mean age 36.3 ± 9.9 years) in 13 rural health clinics in Sabak Bernam, Selangor and Kuala Pilah, Negeri Sembilan. They were doctors (14%), medical assistants (15%), nurses (65%) and others (4%) including pharmacy assistants, nurses' assistants and laboratory assistants. The questionnaire which consisted of four parts (socio-demography, nutritional practice, nutritional knowledge and physical activity programme) were self-administered by the subjects. Results revealed that the nutritional knowledge among the health professionals was excellent with 98.5% having good knowledge. Majority of the health professionals were involved in health counselling (93.6%) and 45.5% include nutrition in their management. There were 9 health clinics involved specifically in *Program Warga Emas*. The most popular programmes were home visit (67%), individual counselling (56%) and rehabilitation programmes (44%). Approximately, 70% of the subjects assessed the nutritional status of their elderly patients. This assessment included regular clinical assessments (89.6%), followed by anthropometric assessments (83.3%), diet history intake (79.2%), biochemistry assessments (69.4%) and physical activity assessments (57.1%). However, only half of the subjects delivered nutrition education through talks and diet counselling for the elderly patients. Most of them used pamphlets (87.9%) as a teaching aid. Only five health clinics carried out exercise education for the elderly patients. Around 63.6% of subjects used the guidelines for management of elderly patients; however, the nutrition component is hardly present in these guidelines. In conclusion, development of nutrition guidelines and education for promotion of healthy ageing is important in increasing the quality of patient care.

A34 Body weight status, body image, self-esteem and eating attitude among male adolescents in Shah Alam, Selangor

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The purpose of this study was to determine body weight status, body image, self-esteem and eating attitudes of male adolescents in Shah Alam. The study also looked into the relationship between all the four variables. A cross-sectional survey was conducted among 96 male students of Sekolah Menengah Seksyen 19 Shah Alam aged 13 to 16. Weight and height were obtained and BMI was calculated. Self-administered questionnaires were distributed to obtain respondents' perceived body image, self-esteem and eating attitudes. The *Contour Drawing Rating Scale* was used to measure respondents' perception of current and ideal body sizes. Other aspects of body image (body weight perception, body parts satisfaction, fitness and self-appearance) were determined using the *Multidimensional Body-Self Relation Questionnaire*. Self-esteem and eating attitude of respondents were measured through *Rosenberg Self-Esteem Scale* and *Eating Attitude Test-26 (EAT-26)* respectively. Based on BMI for age, 10 (10.4%) respondents were underweight, 57 (59.4%) respondents were normal weight, 14 (14.6%) were overweight and 15 (15.6%) were obese. Fifty-eight respondents (61.4%) perceived themselves correctly while 38 (39.6%) respondents misperceived their body weight. More than half of the respondents (62.5%) have an intention to change their body weight status. The mean ideal body size chosen by the respondents was smaller than their mean current body size (5.08 ± 0.59 and 5.3 ± 1.50 respectively). With respect to body parts satisfaction, the respondents were mostly dissatisfied with their height (31.6%), waist and abdomen (31.6%), body weight (30.5%) and muscle tone (24.2%). Nevertheless, most respondents have positive evaluation and orientation of their appearance and fitness status. A majority of the respondents (62.1%) were identified as having a moderate level of self-esteem, and almost a third (32.6%) were likely to develop eating disorders. The study also revealed a significant relationship between body weight status and body weight perception ($\chi^2=21.991$, $p<0.05$). There was a positive relationship between BMI and body size discrepancy score ($p<0.05$, $r=0.430$) indicating that the higher the BMI, the greater the dissatisfaction towards body size. Furthermore, satisfaction with body parts decreases with increased BMI ($p<0.05$, $r=-0.321$). In conclusion, health promotion programmes should be designed to promote a healthy body image among male adolescents.

A35 Body image perception among Chinese primary school girls in Kuala Lumpur

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This cross sectional study was carried out among Chinese primary school girls in Kuala Lumpur to assess body image perception. The subjects consisted of 211 girls aged between 10 and 12 years old. Body image perception was determined using body image questionnaire. Food consumption data were collected using the 24-hour diet recall method for one day by interview on 123 sub-samples. Anthropometric measurements such as weight, height and Body Mass Index were measured. Subjects were categorised into three groups: underweight, normal weight and at risk of overweight according to WHO (1995) BMI-for-age classification. 74.4% of the subjects were concerned about their own body weight. This study found that 47.4% (1:2) underweight, 56.3% (1:2) normal weight and 17.2% (1:5) at risk of overweight subjects had body image distortion. 25.5% of the subjects had

been concerned about their own body weight since age 9 and 21.0% subjects since the age of 10. Most of the subjects were not influenced by anybody about their body image, however 37.6% of them were influenced by their mothers. The main factor causing subjects to be concerned with their own body weight was health (72.0%). The mean energy intake for the subjects was 1708±507 Kcal/day meeting 85.0% of Malaysian RNI (2005) for daily calorie requirement only. The results from this study showed that body image distortion and body image awareness develops at a young age.

A36 Determination of body composition among young women according to different categories of body mass index

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This cross-sectional study measured body fat percentage (BF%) in 148 young women of Malay, Chinese and Indian ethnicity aged 19 to 30 years old. The aim of this study was to gain insight into the relationship between BF% and BMI for various ethnic groups and to suggest BMI cut-off points for obesity among young women. Subjects were divided into four categories of BMI, namely 20.0-22.9, 23.0-24.9, 25-27.5 and >27.5 kg/m². Two techniques were used to measure BF%, namely skinfold thickness using Harpenden calipers and bioelectrical impedance (BIA) technique using Bodystat 1500MDD. Mean BMI and BF% was 24.7±4.0 and 30.6±5.7%, respectively. BF% increased with the increase of BMI. The relationship between BF% and BMI significantly differs between the ethnic groups studied. Indians had the highest BF%, while Malays had the lowest BF% for an equivalent BMI. Measurements of skinfold thicknesses tend to overestimate BF% as compared to BIA technique. It was found that for the same amount of body fat as Caucasians with BMI 30 kg/m² (cut-off for obesity as defined by WHO 1998), the suggested BMI cut-off points for obesity among the young women was 25.0 kg/m². Chinese subjects had the highest cut-off at 26.6 kg/m², followed by Malays at 24.5 kg/m² and Indians 23.3 kg/m². The subjects had higher BF% at a lower BMI compared to Caucasians and the differences were ethnic-specific. In conclusion, the differences in relationship between BF% and BMI are evident, particularly among the three main ethnic groups studied. Thus, the lowering of BMI cut-off points for obesity may be necessary and will have immense public health implications.

A37 Bone mineral density (BMD) of Chinese elderly women in Klang Valley

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It is well known that elderly women have an increased risk for osteoporosis and osteoporotic fractures. Bone mineral density (BMD) is the gold standard for fracture risk. Measurement of bone mineral density provides a quantitative measure of current skeletal status and allows the diagnosis of low bone mass in individuals who have not sustained an osteoporotic fracture. The aim of the study was to measure bone mineral density (BMD) at the lumbar spine and hip of 100 Chinese elderly women aged 65 years old and above, using dual x-ray absorptiometry (DXA). Mean ± SD for age, weight, height and body mass index (BMI), were 68.9±4.2 years, 55.1±8.4 kg, 151.8±4.8 cm and 26.9±5.1 kg/m² respectively. Mean ± SD of the spine and hip were 0.911±0.139 g/cm² and

0.863±0.151 g/cm². The prevalence of osteopaenia and osteoporosis in subjects were 46 % and 11% at the spine, and 9 % and 1 % in the hip. BMD of the lumbar spine correlated with weight ($r = 0.30$, $P = 0.01$), body mass index ($r = 0.29$, $P = 0.01$), body fat ($r = 0.23$, $P = 0.01$) and lean body mass ($r = 0.30$, $P = 0.01$). In conclusion, elderly women were found to have a higher prevalence of spinal osteoporosis compared to hip osteoporosis and it was apparent that body composition influenced their BMD.

A38 Bone health status and nutritional status among institutionalised elderly

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The rising incidence of osteoporosis is well established especially among institutionalised residents. The aim of the study was to determine the bone health status and nutritional status among selected institutionalised elderly in the Klang Valley. Bone Health Status was assessed using Quantitative Ultrasound Sonometry (QUS), which measures Broadband Ultrasound Attenuation (BUA, dB/MHz) at the calcaneus. Weight, height and body fat were assessed using SECA 767 and body fat analyser (HBF-302 Omron). Data were analysed using SPSS software version 11.5 and Diet 4. A total of 99 subjects that comprised of 44 males and 55 females were recruited from seven old folk homes in the Klang Valley. Subjects comprised of 73.7% Chinese, 18.2% Malays, and 8.1% Indians. The mean age of the subjects was 73.8±9.0 years old. The mean weight and height were 53.4±12.0 kg and 155.8±9.5 cm respectively. The body fat mass of the subjects was 16.4±6.7 kg. Body Mass Index (BMI) was 22.1±5.1kg/m². Based on BMI classification, 24.2% of the subjects were underweight, 46.5% had normal weight and 29.3% were overweight. A total of 26.3% subjects had experienced a previous fracture. The mean BUA of Bone Health Status was 58.47±21.19 dB/MHz and the mean T-score was -2.37±1.65. The mean energy intake was 1549.1±713.0 kcal. The mean calcium intake was low, with 377.1mg in males and 316.8mg in females. The mean protein intake was 46.1±42.0. The results revealed significant relationship between BUA and age ($r=-0.270$, $p=0.007$), weight ($r=0.456$, $p=0.000$), fat mass ($r=0.268$, $p=0.008$), BMI ($r=0.403$, $p=0.000$), phosphorus intake ($r=0.238$, $p=0.018$) and protein intake ($r=0.317$, $p=0.001$). However, BUA was found to have no significant relationship with age at menarche ($r=0.136$, $p=0.332$), age of menopause ($r=0.105$, $p=0.456$) and calcium intake ($r=0.175$, $p=0.083$). As a conclusion, bone health status was not satisfactory among the selected institutionalised elderly. Acknowledging the intensity of the osteoporosis problem arising among the elderly, proper health education should be directed to caregivers to improve bone health status among the elderly.

A39 Knowledge, attitude and practices on nutrition and oral hygiene and its relationship with dental caries status among UPM students

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An analytical cross-sectional study was conducted on students of Serdang Campus, Universiti Putra Malaysia (UPM). The students were between ages 20 and 29 years old. The objective of this

study was to assess the level of knowledge, attitude and practices regarding nutrition and oral hygiene among UPM students and its relationship with dental caries status. Students who visited the Dental Clinic of UPM were selected as respondents. One hundred and thirty-three (133) questionnaires were distributed at the waiting room but only 127 were fully filled-up. The questionnaires were self-administered. Sources of information on oral health were also asked. Results of this study revealed that pamphlets, posters and television were the main sources of information on nutrition and oral health. Students' knowledge concerning nutrition and oral hygiene was generally moderate (48.0%). Thirty-six students had high level of knowledge and 30 students were categorised as low level. Results showed 52% of students have positive attitude while another 48% of students have poor attitude on dietary habits and oral hygiene. Total practices score had been categorised into three groups: 26.0% students were categorised as good practices, while 51.2% were in the category of fair practices and 22.8% students had poor level of practices. Pearson's Correlation showed significant relationship between knowledge and attitude ($p < 0.001$), between attitude and practices ($p < 0.001$) and between knowledge and DMF(T) ($p < 0.05$). Spearman's rho showed a significant correlation between practices and DMF(T) ($p < 0.01$). The results revealed that 89.8% of the students had dental caries. Their mean number of decayed, missing and filled teeth DMF(T) was 4.72 (sd 3.81). In other words, only about one in ten students was caries-free. Caries prevalence increased with age. Females had higher mean DMF(T) compared to males. Arts stream students reported higher mean DMF(T) than science stream students. Chinese students had higher mean DMF(T) than Malay students, and urban students had higher mean DMF(T) than rural students. In conclusion, this study shows there is a strong relationship between knowledge, attitude and practices on dietary habits and oral hygiene with dental caries.

A40 A needs assessment study: nutritional status of Orang Asli children in Sepang district and Carey Island, Selangor

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This study was conducted to determine the nutritional status of Temuan and Mah Meri children in Sepang district and Carey Island, Selangor. The respondents consisted of 152 children (Temuan - 80 and Mah Meri - 72) aged 1 - 6 years old. Data on demographic, socioeconomic, nutritional and health status were obtained using structured questionnaire. The prevalence of significantly underweight, wasting and stunting among the Temuan children aged 1- 3.99 and 4-6.99 years were (51.2% and 25.6%), (4.7% and 5.1%) and (48.9% and 38.5%) respectively. In general, the prevalence of poor nutritional status was higher among the Mah Meri children than Temuan children. The survey data clearly indicated that the average intake of many nutrients especially energy and micronutrients, at all ages, were below the RDA among the two ethnic groups. Malnutrition was associated with feeding practices, early weaning and less consumption of food variety. Breastfeeding was still a general practice among Orang Asli mothers, however, insufficient nutrition education tended to reduce the duration of breastfeeding (less than 2 years) and increased early weaning. Although the results of this study do not represent the nutritional status of all Orang Asli children, these findings may be useful for planning strategies to meet health and nutrition education needs of the Orang Asli community. Furthermore, by improving the mother's knowledge and skills on health and nutrition, we will improve the nutritional and health status of the children and eventually the entire community.

A41 Haemoglobin status in physically active men

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A cross-sectional comparative study was conducted to determine the haemoglobin status among physically active groups in Kota Bharu. The study population comprised 83 adult male athletes from 8 different types of sports (athlete group), 80 active men who exercised a minimum of 30 min per day for at least 3 times per week (exercise group), and 80 inactive men (sedentary group). All the respondents were aged between 18 and 44 years. A total of 5 ml of fasting venous blood sample was taken from each respondent. Haemoglobin concentration was determined by the cyanmethemoglobin method. The results showed that the mean haemoglobin of the athlete (14.9 ± 1.6 g/dL) and exercise (15.2 ± 1.5 g/dL) groups was significantly lower ($P < 0.05$) than the sedentary group (15.8 ± 1.3 g/dL). The prevalence of anaemia (Hb < 13 g/L) was highest in athletes (10.8%), compared to the exercise (5.0%) and sedentary (2.5%) groups. In conclusion, physically active groups, especially athletes are at risk of becoming anaemic. Therefore, appropriate efforts should be taken by health professionals and Sports Nutritionists to address this problem, since anaemia has been associated with detrimental effects on exercise and sport performance.

A42 Risk factors of hypertension amongst Chinese patients receiving treatment at Greentown Health Clinic, Ipoh

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The purpose of this study is to determine the risk factors of hypertension amongst Chinese patients receiving treatment at Greentown Health Clinic, Ipoh. This cross-sectional study used purposive sampling method. There were 50 respondents aged 40 years and above with hypertension (hypertensive group) and 50 respondents without hypertension (control group) involved in the study. The risk factors studied were age, gender, family history, obesity, smoking habit, alcohol consumption, physical activity level, stress level and food intake practices. Interview sessions were conducted using a questionnaire followed by anthropometric and blood pressure measurements. Most of the respondents (65.0%) were females with the mean age for hypertensive group and control group at 65.1 ± 9.3 years and 58.6 ± 7.1 years respectively. Although 69.0% were unemployed, majority (91.0%) have a monthly family income of more than RM 1000. There were 24.0% respondents with family history of chronic diseases. A total of 14.0% of respondents were current and ex-smokers with the hypertension group starting smoking earlier, at the mean age of (16 ± 4.0 years). Nevertheless, 88.0% seldom consume alcohol and all of them drink less than 21 units per week. Despite only 36.0% respondents performing physical activities, 80.6% did it adequately. Majority (85.0%) have low stress levels (< 150 LCU) and about half of the respondents consume foods high in fiber, vitamins and minerals quite often. There were 51.0% respondents with normal BMI, in which mean body weights and heights were higher in the control group, whereas mean waist circumference was higher in the hypertension group. Significant relationship ($r = -0.361$, $p = 0.010$) was found between physical activity and systolic blood pressure in the control group using the Pearson Correlation Test. Although this study could not show the significant risk factors in the hypertension group, educational activities, support groups, frequent health checks and healthy lifestyle practices still need to be encouraged in order to reduce the disease burden to the affected individual, family and societies.

Group B: Dietary Intake, Consumption Pattern and Association with Diseases

B01 Body composition, body image perception, energy balance and dietary practice among male athletes in Sport School Bukit Jalil, Kuala Lumpur

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This cross sectional descriptive research was conducted to determine the relationship between body composition, body image perception, energy balance, and dietary practice among male athletes in Sport School Bukit Jalil. Data were collected using a questionnaire, anthropometric measurements, Contour Drawing Rating Scale (CDRS), Body Cathexis Scale, 2-day 24-hour dietary and activity records, and Eating Attitudes Test (EAT-26). A total of 31 male athletes ranging in age from 13 to 15 years old were involved in this study. They comprised 10 Malays (32.3%), 16 Chinese (51.6%), 2 Indians (6.5%) and 3 other races (9.7%). The athletes were involved in any one of the following sports: basketball, badminton, cricket, athletic, squash, diving, gymnastics and weight lifting. Results showed that the athletes' involvement in sports ranged from 1 to 8 years. Their mean Body Mass Index (BMI) was 19.6 ± 2.7 kg/m² and none of the athletes were obese, 1 (3.2%) was underweight, 25 (80.7%) were normal weight, and 5 (16.1%) overweight. By comparing the respondents' actual BMI to their perceived body weight status, 11 (35.5%) respondents were categorised as *under estimators*, 1 (3.2%) *over estimators*, and 19 (61.3%) as *correct estimators* of their body weight. Using the CDRS, the mean for current body size and ideal body size perceptions were 5 ± 1.2 and 5.1 ± 0.4 respectively. Most of the subjects (80.6%) chose figure number 5 as their ideal body size. The mean total body parts satisfaction score was 32.4 ± 4.6 and all of the respondents were categorised as being dissatisfied with their body parts. The mean for energy intake, energy expenditure and energy balance were 1787.3 ± 502.4 kcal, 1955.7 ± 591.3 kcal, and -168.4 ± 655.5 kcal respectively. Mean percentage contributions of carbohydrate, protein and fat to total energy intake were $52.2 \pm 13.3\%$, $22.5 \pm 4.6\%$ and $33.5 \pm 8.8\%$ respectively. The mean total score for EAT-26 was 10.9 ± 7.3 , but 4 (12.9%) subjects were categorised as being prone to eating disorders. Eight (25.8%) subjects were taking supplements; 6 (75%) were taking vitamin C and 2 (25%) were taking protein supplements. There is a strong positive correlation between BMI and perception of current body size ($r=0.771$, $p<0.01$), indicating that the athletes were generally able to perceive correctly their current body size. There is a weak negative correlation between energy balance and BMI ($r=-0.397$, $p<0.05$), showing that subjects with high BMI may tend to be in a negative energy balance, perhaps to lose weight. Results show that the athletes generally had normal body weight and body fat, but some of them had incorrect body image. Most of the athletes had a negative energy balance and 4 (12.9%) subjects were identified as being prone to eating disorders. Prevention programmes on healthy body image perception and healthy dietary practices should be designed specially for these athletes.

B02 Relationship between calcium intake, physical activity and body mass index with bone health status among a sample of Chinese women aged 40 to 65 years

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The objective of the study was to determine the relationship between daily calcium intake, current physical activity and body mass index (BMI) with bone health status among a sample of Chinese women aged 40 to 65 years old in Taman Indah Perdana, Kepong. Socio-demographic background, menopausal status, calcium supplements and milk intake pattern, physical activity level, knowledge related to osteoporosis and the need for intervention programme were obtained using a self-administered questionnaire. Body weight, height, and bone health status were measured using a weighing scale (TANITA), microtoise tape, and ultrasound machine (QUS-2™). Calcium intake was assessed through a semi-quantitative Food Frequency Questionnaire (SFFQ). Data were analysed using the Statistical Package For Social Science (SPSS) version 11.5 and Microsoft Excel programmes. Pearson correlation was used to test the relationship between two variables. A total of 63 women participated in this study. The mean age of the respondents was 47.33±6.77 years. About 30% of them had attained menopause at a mean age of 50.68±1.60 years. Only 22.2% were taking calcium supplements and 49.2% were currently consuming milk daily. About 76% of them did not consume any milk during their younger adult age (20-30 years). The mean calcium intake was 598.1±310.8 mg per day. About 73% fulfilled the Malaysian RDA (450 mg) However, based on the recommendation by FAO/WHO, majority (76.2%) did not meet the 2/3 RDA. The mean physical activity level of the respondents was 4642.08±1369.94 MET-minutes/week. About 59% of them had their level of physical activity of less than the population mean. The mean weight and height of the respondents was 59.6±6.8 kg and 1.5±0.1 m, respectively. The mean BMI was 25.2±3.2 kg/m². A total of 46.0% were classified as overweight and 6.3% were obese. In the assessment of bone health status, the mean Broadband Ultrasound Attenuation (BUA) was 88.9±18.9 dB/MHz and the mean T-score was -0.01±1.52. A total of 20.6% and 4.8% of the respondents were classified as osteopaenic and osteoporotic, respectively. The results revealed significant relationship between BUA with daily calcium intake ($r = 0.273, p < 0.05$), and with current physical activity level ($r = 0.250, p < 0.05$). However, the data failed to show any significant relationship between BMI with BUA. In conclusion, high calcium intake and high current physical activity level were associated with high bone health status among the respondents. It is hoped that the results of this study can be used as baseline data to develop health education and intervention programmes related to osteoporosis in the future to ensure that the elderly, especially women, can maintain their quality of life without being threatened by the increasing incidence of osteoporosis.

B03 Overweight and normal-weight female adolescents: comparison of body image, dietary practice and physical activity

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This study was conducted to compare body image, dietary practice and physical activity between overweight (OW) and normal-weight (NW) female adolescents. Through an anthropometric screening of 792 female adolescents from 3 selected secondary schools, the prevalence of overweight and obesity was 13.4% and 5.7% respectively. Of the overweight and obese subjects identified, 100 were

selected and matched for age, ethnicity and pubertal status with 100 NW subjects to be included in this study. Of the 200 subjects, 68.0% were Malays, 23.0% Chinese and 9.0% Indians. The mean age for both groups of subjects was 13.51 ± 0.50 years; almost all (97.0%) had achieved menarche, and no significant differences were found in socio-demographic factors between the two groups. Results showed the OW subjects were more likely to have a greater body size discrepancy ($t=16.061$, $p<0.001$), desired a smaller ideal body size and wished to reduce their weight (100.0%), were dissatisfied with their overall body parts ($\chi^2=40.376$, $p<0.001$), and had a negative energy balance ($\chi^2=53.968$, $p<0.001$) by expending more than consuming energy (2368.47 ± 510.38 kcal) ($t=-14.098$, $p<0.001$). Conversely, the NW subjects were more likely to have a positive energy balance by consuming more than expending energy (1811.04 ± 605.91 kcal) ($t=-2.488$, $p<0.05$), and to practise a sedentary lifestyle ($\chi^2=64.387$, $p<0.001$). No significant differences were found in weight management knowledge level, perception of body weight status, and eating attitude and behavior. Although these subjects (OW: 82.0%; NW: 77.0%) claimed that they had received information on weight management, a majority (OW: 58.0%; NW: 54.0%) had a low level of weight management knowledge. There were 38.0% of NW and 33.0% of OW subjects who had an incorrect perception of weight status. Using Eating Attitude Test-26 (EAT-26), NW subjects (28.0%) and 18.0% of OW subjects were identified as being prone to eating disorders. Future intervention and prevention programmes for female adolescents should focus on correcting body image perception, promote healthy dietary practices and active lifestyle.

B04 Breakfast consumption and cognitive performance among Malay primary school children in Kuala Lumpur

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A Cross sectional study was carried out to investigate the relationship between breakfast consumption and cognitive performance among primary school children in Kuala Lumpur. The sample consisted of 160 subjects, 80 (50%) boys and 80 (50%) girls. All subjects were Malay ethnic, healthy, 9 years old and had normal weight according to NCHS. Subjects were divided into 4 groups; groups 1, 2 and 3 were given different types of breakfast, whereas no breakfast was given to group 4. Group 1 was given a mixture of cereal plus milk and a chocolate malt drink, group 2 was given breakfast cereal only and group 3 was only given a chocolate malt drink. Cognitive performance was assessed using a validated Wechsler Intelligent Scale for Children-III^{UK} subtests, which was translated to Bahasa Malaysia. Three subtests were run, which was coding, digit span and arithmetic. There were significant differences ($p<0.05$) among the breakfast and non-breakfast groups in all 3 WISC subtests and also for cognitive performance. Beside that, majority of the subjects in the breakfast group were in the high average category for coding and average category for digit span and arithmetic test. But for the non-breakfast group, most of the subjects were in the low average group in all the 3 WISC subtests. Pearson correlation test showed that there was a significant correlation between coding ($p<0.05$) and arithmetic ($p<0.01$) with the number of siblings. On the other hand, all 3 WISC subtests were found to have a high significant correlation ($p<0.01$) with subject mother's education level and the accessibility to mass media at home. This study further strengthens the importance of breakfast consumption on cognitive performance among primary school children.

B05 Fat absorption in selected Malay *kuih* and its relationship with preference towards fried foods

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Almost everyone likes to eat fried foods. However, excessive intake of fried foods will cause obesity and cardiovascular disease. This study was carried out to determine the content of fat, protein, moisture, ash, carbohydrate and fat absorption in curry puff, *keropok lekor* and fried banana. This study also looks at the preferences of these foods between ethnicity. Half of the food samples were cooked while the other half was the control. Curry puff, *keropok lekor* and banana were fried at temperature of $180 \pm 3^\circ\text{C}$. Frying time of curry puff and *keropok lekor* was 6 minutes and 4 minutes for fried banana. The three food samples were fried for 4 times. Questionnaires on preferences of the three food samples were given to 50 Malay students, 40 Chinese students and 10 Indian students. Sensory evaluation of the three foods was also carried out. The proximate analysis result showed a significant ($p < 0.05$) increase in fat absorption in curry puff (30.3%), *keropok lekor* (56.0%) and fried banana (17.5%). The questionnaire results indicated that 45% Chinese and 70% Indian subjects liked curry puff while 40% Malay subjects preferred *keropok lekor*. The sensory evaluation result showed significant differences ($p < 0.05$) in colour attributes between Malay (3.20) and Chinese panelists (3.64). For the sweetness attribute, the Indian panelists felt that the foods were less sweet. The Malay and Indian panelists agreed that the foods were not spicy. The overall mean acceptability of the three foods for Malay subjects was 3.77, Chinese subjects 3.59 and Indian subjects 3.09. In conclusion, *Keropok lekor* absorbed the highest amount of oil compared to curry puff and fried banana. The Chinese and Indian subjects liked curry puff while the Malay subjects liked *keropok lekor*.

B06 Overweight and normal weight male adolescents: comparison of dietary practice, physical activity and body image

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A comparative study on dietary practice, physical activity and body image was conducted between overweight and normal weight male adolescents from three selected schools in Kuantan, Pahang Darul Makmur. Of 611 Form 1 and Form 2 male students screened, 24.6% were overweight and obese. A total of 100 overweight and obese male adolescents were selected and matched for age and ethnicity with 100 normal weight adolescents to be included in this study. The respondents comprised 59.0% Malays, 32.0% Chinese, and 9.0% Indians with a mean age of 13.6 ± 0.5 years. The mean BMIs for normal weight and overweight respondents were 18.2 ± 1.5 kg/m² and 26.6 ± 3.9 kg/m² respectively. No significant differences were found in socio-demographic factors between normal weight and overweight respondents. Further, there was no significant difference in total daily energy intake between the two groups. However, overweight respondents expended more energy compared to normal weight respondents ($t = -10.3$, $p < 0.001$). Majority of the normal weight respondents (93.0%) and overweight respondents (82.0%) were categorised as sedentary. Most of the normal weight respondents (69.0%) had positive energy balance, while most of the overweight respondents (67.0%) had negative energy balance. Based on EAT-26 scores, the overweight group was more prone to eating disorders ($\chi^2 = 7.2$, $p < 0.01$) and dieting ($t = -3.5$, $p = 0.01$) compared to the normal weight group. As for body image, most of the overweight respondents were more likely to

have incorrect perception of their body weight status ($\chi^2=18.3$, $p < 0.001$), dissatisfied with their body size and desired to have a smaller body size ($t=10.478$, $p < 0.001$), and dissatisfied with their overall body parts ($\chi^2=33.7$, $p < 0.001$), as compared to normal weight respondents. From the Weight Management Inventory, majority of respondents for both groups had a moderate level of weight management knowledge and no significant association was found between weight management knowledge level and respondents' weight status. Intervention programmes may help adolescents to better understand their health by providing appropriate and worthy information in relation to healthy dietary practices, positive body image, and physical activities.

B07 Relationship between milk, fruit and vegetable intake with bone health status among primary school students

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The objective of this cross-sectional study was to determine the relationship between intake of milk and dairy products, fruits and vegetables with bone health status among standard six students in Sekolah Kebangsaan Sri Serdang. Background information and dietary intake were obtained through an interviewer-administered questionnaire. Dietary intake was assessed by a validated food frequency questionnaire (FFQ). Weight, height and bone health status were assessed using a weighing scale (TANITA), body meter (SECA), and ultrasound machine (QUS-2), respectively. Caregivers' background information, knowledge, attitude and practices related to osteoporosis were assessed using a validated self-administrated questionnaire. A total of 71 subjects (36 boys and 35 girls) aged 12 years old and 50 caregivers were involved in this study. The mean weight and height of the respondents were 43.4 ± 12.9 kg and 149.9 ± 8.0 cm respectively. The mean body mass index (BMI) of the subjects was 19.08 ± 4.39 (kg/m²). As a measure for the bone health status, the mean Broadband Ultrasound Attenuation (BUA) was 74.93 ± 11.72 dB/MHz. About 54.1% of the girls had reached menarche with 66.7% of them having irregular menstrual cycle. The mean calcium and potassium intake of the subjects was 554 ± 355 mg and 2164 ± 1736 mg, respectively. Approximately 70% of the subjects consumed milk at least once a week. The mean percentage score for knowledge, attitude and practices for the caregivers was 54.6 ± 15.8 , 67.4 ± 7.9 and 68.5 ± 13.1 , respectively. The results revealed no significant relationship between BUA with calcium intake ($r = -0.045$, $p > 0.05$), potassium intake ($r = -0.135$, $p > 0.05$), knowledge ($r = -0.037$, $p > 0.05$), attitude ($r = -0.092$, $p > 0.05$) and practices ($r = -0.066$, $p > 0.05$). Despite no significant relationship between these factors and bone health, calcium intake, knowledge, attitude and practices related to osteoporosis are still important to improve bone health status. Therefore, various programmes related to risk factors, consequences and prevention of osteoporosis should be carried out to increase the students' and caregivers' awareness about the importance of practising healthy dietary intake.

B08 Relationship between nutritional knowledge, dietary calcium intake and physical activity with bone health status among a sample of Chinese women aged 40 to 65 years

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The main objective of this cross-sectional study was to determine the relationship between nutritional knowledge, dietary calcium intake and physical activity with bone health status among a

sample of Chinese women aged 40 to 65 years in Taman Midah Lutheran Church, Cheras. Socio-demographic information, family history of osteoporosis, menopausal status and nutritional knowledge related to osteoporosis were obtained through a self-administered questionnaire. Physical activity (for the past 7 days) and dietary calcium intake (assessed using a semi-quantitative food frequency questionnaire) were obtained through a face-to-face interview. The weight, height and bone health status were measured using a weighing scale (TANITA), body meter (SECA) and ultrasound machine (QUS-2), respectively. A total of 65 subjects participated in this study. The mean age of the subjects was 50.23 ± 6.94 years. Majority (81.5%) of them were married and about 55% were housewives. About 62% had a minimum level of secondary education. The mean age of menopause was 50.10 ± 4.25 years with 44.6% of the subjects having attained menopause. The mean knowledge scores was 57.37 ± 16.71 %. Majority (55.4%) of them were categorised in the second tertile of knowledge scores. About 34% and 11% of them were in the upper and lower tertile of knowledge scores, respectively. The mean total dietary calcium intake was 542.54 ± 272.36 mg per day with 56.7% of the subjects taking more than the Malaysian RDA (450 mg/day). However, only 20% of the subjects met 2/3 RDA as recommended by FAO/WHO. The mean MET-min per week for vigorous intensity activities, moderate intensity activities and walking, were 561.23 ± 1237.13 , 655.38 ± 752.98 and 628.52 ± 760.22 , respectively. The mean of the total MET-min per week were 1845.14 ± 1751.02 . Based on the International Physical Activity Questionnaire (IPAQ) Research Committee classification, majority (40%) of the subjects were categorised in the sufficiently active, 33.8% in highly active and 26.2% in insufficiently active categories. The mean body mass index (BMI) was 24.18 ± 3.72 kg/m², with about 43% classified as overweight. For the bone health status, the mean Broadband Ultrasound Attenuation (BUA) was 86.59 ± 18.82 dB/MHz with 53.8% of the subjects having bone mass of above the mean population value. The results revealed significant relationship between age and BUA ($r = -0.432$, $p < 0.01$) and T-score ($r = -0.428$, $p < 0.01$); dietary calcium intake and BUA ($r = 0.311$, $p < 0.05$) and T-score ($r = 0.313$, $p < 0.05$). In conclusion, bone health tends to deteriorate with advancing age and calcium intake is important in maintaining optimal bone health status. Therefore, women are recommended to have adequate intake of calcium in their diet as well as optimal level of physical activities. Nutrition and health education and relevant intervention programmes should be designed to improve knowledge associated with bone health especially among women who are at greater risk of osteoporotic fractures with advancing age.

B09 Nutrient intakes, physical activity and bone health status among secondary school students

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The purpose of this cross-sectional study was to determine the nutrient intakes, physical activities and bone health status among secondary school students. Background information, family history of osteoporosis, physical activity and pattern of food intakes were obtained through a self-administered questionnaire. Nutrient intake was assessed using 24-hour dietary recall. Body weight, height and bone health status were assessed using weighing scale (TANITA), body meter (SECA) and ultrasound machine QUS-2TM respectively. Data were analysed using the Statistical Package for Social Sciences Version 12 (SPSS Version 12). A total of 75 subjects aged 13 years were involved in this study with 60.0% females and 40.0% males. Most of the subjects were Malays (64.0%). Mean weight and height of the subjects was 49.3 ± 12.5 kg and 156.5 ± 8.1 cm respectively. The mean body mass index (BMI) was 20.0 ± 4.4 kg/m². The mean for Broadband Ultrasound Attenuation (BUA) and T-score were 79.3 ± 13.2 dB/MHz and -0.72 ± 1.11 , respectively. Approximately half of the subjects were classified as normal while the others were osteopaenic. Approximately one-third did not consume milk. A total of 45.3 %, 76.0% and 92.0% of the subjects drank coffee, tea and soft drinks

respectively. The mean for calorie, protein, calcium, sodium and potassium intake was 1338 ± 553 kcal, 51.8 ± 26.7 g, 347.5 ± 214.4 mg, 1609.5 ± 1136.5 mg and 1054.9 ± 528.6 mg respectively. Majority of the male (60.0%) and female (82.2%) subjects consumed less than 2/3 the Malaysian RDA for calories. For other nutrients, a total of 30.7%, 74.7%, 56.0% and 98.7% subjects consumed lower than 2/3 the Malaysian RDA for protein, calcium, sodium and potassium. Approximately half of the subjects were classified as sedentary, 33.3% as moderately active and 22.7% as very active. Pearson correlation test indicated no significant association between T-score and BUA with calorie, protein, calcium, sodium and potassium intake. The Spearman correlation test showed no association between T-score and BUA with physical activity. Although no significant association was found between nutrient intakes, physical activity and bone health status, these two factors are the important risk factors of osteoporosis. It is recommended that prevention of osteoporosis start early in life.

B10 Relationship between calcium intake and physical activity with bone health status among adolescents

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The objective of this cross-sectional study was to determine the relationship between calcium intake and physical activity with bone health status among adolescents (aged 13-15). Information of sociodemography, dietary habits, physical activity, knowledge and awareness were obtained through an interviewer-administered questionnaire. Dietary calcium intake was assessed using a quantitative food frequency questionnaire. Body weight, height and bone health status were assessed using a weighing scale (TANITA), body meter (SECA) and ultrasound machine (QUS-2), respectively. Data were analysed using the Statistical Package for Social Sciences (SPSS), version 12.0. A total of 77 subjects were involved in this study with 50.6% boys and 49.4% girls. The mean age of the respondents was 14.2 ± 0.5 years. The mean weight, height and body mass index (BMI) was 51.0 ± 10.1 kg, 1.61 ± 0.1 m and 19.58 ± 3.49 kg/m², respectively. Mean calcium intake was 548.8 ± 353.4 mg/day. Only 24.7% of the respondents consumed more than the Malaysian RDA level for calcium intake. For the physical activity, more than half (66.2%) was categorised as moderately active, while 27.3% very active and 6.5% sedentary. Mean Broad Ultrasound Attenuation (BUA) was 77.51 ± 13.5 dB/MHz and T-score was -0.91 ± 1.09 . Thus, 50.6% were classified as osteopaenic and 2.6% as osteoporotic. The t-test showed significant difference in mean values of BUA ($t = -2.22$, $p < 0.05$) and T-score ($t = -2.03$, $p < 0.05$) between adolescent boys and girls, in which adolescent girls had better bone health status than boys. There was no significant correlation between BUA and T-score with calcium intake or physical activity. However, weight and BMI showed significant correlations with BUA ($r = 0.28$, $p < 0.05$) and T-score ($r = 0.29$, $p < 0.05$). In conclusion, data showed that adolescent girls have better bone health status as compared to boys. Although this study showed no relationship between calcium intake and physical activity with bone health status, these two factors can reduce risks of osteoporosis. It is hoped that results of this study can be used as basis data to develop intervention for increasing knowledge and awareness on osteoporosis. This is to ensure that the young population in the future is able to prevent the occurrence of osteoporosis early in life and maintain good bone health status.

B11 Assessment of level of knowledge and attitude towards osteoporosis, calcium intake and physical activities among a sample of Malay women 40 years old and above in Felda Mengkawang, Ajil, Terengganu

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The purpose of this study was to determine the level of knowledge and attitude towards osteoporosis, calcium intake and physical activities among a sample of Malay women in Kampung Felda Mengkawang, Ajil, Terengganu. A total of 100 respondents 40 years and above was selected by simple random sampling. Subjects were interviewed using a set of questionnaires. Background information, milk consumption, menopausal status, family history of osteoporosis, need for intervention programmes, and sources of information about osteoporosis were also obtained. The mean age of respondents was 44.7±3.9 years. Mean number of children was 6.6±2.2. Mean years of education was 6.5±1.9 years. The mean monthly salary was RM645±134.67. Majority of the respondents (92%) were consuming milk. Most of them (87.5%) had attained menopause between one and five years. None of the respondents had experienced any family history of osteoporosis. All of them expressed interest in intervention programmes related to osteoporosis. Majority of the respondents (99%) had heard about the relationship between calcium and osteoporosis through mass media especially television (99%). The mean score for knowledge and attitude toward osteoporosis were 79.07±5.86 and 83.60±5.87, respectively. The mean calcium intake was 603±172.21 mg. Majority of the respondents (90%) had intake of calcium above the Malaysian RDA (450mg). About 44% of the respondents fulfilled 2/3 of the proposed Recommended Nutrient Intake for Malaysians (RNI, 2005). Majority of the respondents (77%) had calcium intake below 2/3 of the level recommended by FAO/WHO (2002). The main source of calcium was vegetables (28.3%). Majority of them (88%) had moderate level of physical activities. Pearson Correlation Test and Chi Square analysis showed no significant relationship between knowledge and attitude with calcium intake, years of education, and physical activities. However, there was a significant correlation between attitude score and calcium intake ($r=-0.240$, $p<0.05$). In conclusion, the level of knowledge related to osteoporosis among the respondents was relatively high and they had a positive attitude toward osteoporosis. Therefore, information and health education particularly on osteoporosis should be provided from the adolescent stage as well as to those who are at high risk.

B12 Development and validation of food frequency questionnaire assessing intake of total fat, saturated, monounsaturated and polyunsaturated fatty acids

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Fat and fatty acids are the most difficult nutrients to assess for habitual intake in a group of individuals because their trend of intake varies tremendously between people in a group especially in the Malay community. Therefore, this study was done to develop and validate a food frequency questionnaire (FFQ) to assess intake of fat, saturated, monounsaturated and polyunsaturated fatty acids by comparing it with 24-hour dietary recalls as a reference method. A validated FFQ for assessing fat intake was reconstructed and categorised into three mealtimes that consisted of breakfast, lunch/dinner and evening tea/ supper respectively, and two different categories for beverages and snacks. This new 200-item FFQ is focused on the cooking method of the items besides the items

on their own. A total of 20 Malay women aged between 30 to 55 years were selected as the subjects of this study. The FFQ was interviewer-administered and compared with three 24-hour dietary recalls. This study shows that there is a significant difference in the mean intake of energy and saturated fatty acids between both methods. The subjects overestimated the intake of energy by 7.48% and underestimated the intake of saturated fatty acid by 9.14% when reporting their dietary intake using the FFQ. Pearson correlation test shows that the correlation coefficient value is highest for the intake of protein (0.71) and lowest for the intake of saturated fatty acid (0.41). Meanwhile, cross-classification for both methods into quartiles of intake resulted in correct classification into the same quartile and the same or adjacent quartile in 55% to 65% and 85% to 100% of the subjects respectively. Only a maximum of three subjects were grossly misclassified. As a conclusion, this newly developed and validated FFQ shows good validity compared to the other studies done and can be used to estimate habitual dietary intake in a group of Malay individuals.

B13 Effect of adding fat to rice on blood glucose response among healthy Malay young adults

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This cross-sectional study was carried out to determine the blood glucose response among healthy Malay adults (5 males and 5 females) after consuming rice with varied amounts of fat added. Simple randomised sampling was done among students aged between 20 and 23 years old at Fakulti Sains Kesihatan Bersekutu. Subjects consumed rice with a varied quantity of fat added (0, 5, 10, 20 and 40 g fat) and reference food (glucose) at different days after over-night fasting (10 - 12 hours). Both test food and glucose contained 50g of available carbohydrate respectively. On each morning, finger-prick capillary was taken at 0 min (fasting) and 15, 30, 45, 60, 90 and 120 min after finishing the test meal. The blood glucose values for each subjects were used to calculate the area under glucose curve (iAUC) that represents blood glucose response. Mean age and BMI of the subjects are 21.3 ± 0.9 years and 21.6 kg/m^2 , respectively. Overall, min postprandial blood glucose response of test food and glucose achieved peak values at 30 min. However, the peak glucose response was reduced by adding more fat. Glucose was the highest iAUC (170.4 mmol.min/l) compared with all test food ($p < 0.01$). Within the test food, adding more fat reduced their iAUC. Adding as little as 5g fat can reduce almost half iAUC value compared with glucose. The iAUC rice with 5g was the highest (50.9 mmol.min/l) while rice with 40g fat was the lowest (9.8 mmol.min/l). Results also indicated significant differences between rice containing 5g fat and rice containing 20g and 40g fat ($p < 0.05$). Significant negative correlation was found between values of iAUC of all the test food with fasting blood glucose ($p < 0.05$) and with added fat ($p < 0.01$). As a conclusion, adding fat from 5g to 40g to rice will reduce blood glucose response but not in linear shape.

B14 Diet and lifestyle for cancer prevention: knowledge, attitudes and practices among rural adults in Kuala Berang, Terengganu

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A study was conducted to assess diet and lifestyle knowledge, attitudes and practices for cancer prevention among rural adults. The World Cancer Research Fund (WCRF) guidelines for cancer

prevention were used for comparison. Eighty-five females and 50 males in Kampung Pauh, Kuala Berang, Terengganu participated in this study by systematic sampling. Subjects were interviewed with a structured questionnaire. BMI was determined for all subjects. The average age of the subjects was 37.64 ± 12.78 years. Mean BMI of the subjects was $24.03 \pm 4.54 \text{ kgm}^{-2}$. The results show that 72.6% of subjects had moderate scores and 26.7% obtained high scores. For attitude, 74.1% obtained high scores. For daily fat intake, 95.6% of the respondents were in the satisfactory category (= 30% from overall energy intake). For intake of fruits and vegetables, only 52.6% of the respondents complied with the guidelines ($\$ 400 \text{ g}$ per day), while for red meat intake, 98% of subjects were in the satisfactory category ($< 80 \text{ g}$ per day). For intake of plant-based food, approximately 79% of the respondents met the guidelines with daily intake of $\$ 600 \text{ g}$. For salt intake, 88% of the respondents were in satisfactory category with intakes of $< 6 \text{ g}$ per day. The results also show that 27.1% of female and 20.0% of male respondents took dietary supplements. Approximately 44.0% of male and 2.4% of female respondents were smokers. Walking was the most common form of physical activity by these subjects. The mean daily duration of walking was $91.7 \pm 45.8 \text{ min/day}$. None of the subjects met the daily requirement for walking as recommended by WCRF. The results revealed significant relationships between i) knowledge scores and age ($r = -0.440$, $p = 0.01$), education ($r = 0.488$, $p = 0.01$) and household income ($r = 0.326$, $p = 0.01$); ii) attitude scores with age ($r = -0.214$, $p = 0.013$) and years of education ($r = 0.187$, $p = 0.030$); and iii) knowledge scores with attitude ($r = 0.564$, $p = 0.001$). No significant relationships were observed between knowledge and intake of fruits and vegetables, fat, plant-based foods and intake of red meat. However a weak negative correlation between knowledge and salt intake was found ($r = -0.286$, $p = 0.001$). Attitude did not influence dietary practices. In conclusion, the knowledge levels of the rural subjects were moderate but they had a good attitude for cancer prevention. However, dietary practices, especially intake of fruits and vegetables and exercise habits, need improvement. Rural adults, especially the older group, should be exposed to cancer preventive nutrition education to improve their diet and lifestyle practices in a positive way for the prevention of cancer and other chronic diseases.

B15 Level of knowledge and attitude associated with osteoporosis, calcium intake and physical activities among a sample of nurses

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A cross-sectional study was carried out to determine the level of knowledge associated with osteoporosis and calcium intake and physical activities among a sample of 95 nurses aged 23-54 in Kuala Kubu Bharu Hospital and health clinics in the district of Hulu Selangor, Selangor Darul Ehsan. Data were collected using a self-administered questionnaire. Calcium intake was assessed using a Semi-quantitative Food Frequency Questionnaire (SFFQ), while the level of physical activity level was assessed using the IPAQ Physical Activity Questionnaire. Data were analysed using the Statistical Package for Social Sciences (SPSS) for windows version 12.0. Majority (53.7%) of the respondents were staff nurses with a mean age of 37.68 ± 9.65 years. Only 14.7% of the respondents had attained menopause. All respondents (100%) had received information about calcium and osteoporosis particularly from the doctors (65.3%). Television, magazines and newspapers were the major sources of information. The mean knowledge score of the respondents was 20.36 ± 2.35 , ranging between 15-25 points. Majority (69.5%) of the respondents were in the second tertile of the knowledge score. The mean of the attitude score was 15.39 ± 1.67 , ranging between 10-19 points. Majority (68.4%) of the respondents were in the second tertile of the attitude score. A total of 82.1% of the respondents consumed milk, particularly full cream milk (47.4%) and low fat milk (44.9%). Only 27.4% of them were taking calcium supplements. The mean calcium intake was $496.07 \pm 175.9 \text{ mg}$, ranging between 71.8 mg to 813.5 mg. Majority of the respondents fulfilled more than the Malaysian RDA (1975) for

calcium intake. The main source of calcium in the diet was vegetables (31.7%). About half (54.7%) of the respondents were categorised as moderately active. Pearson correlation showed a significant positive correlation between knowledge and attitude scores ($r = 0.353$, $p < 0.01$) and a negative correlation between attitude scores and calcium intake ($r = -0.208$, $p < 0.05$). Nevertheless, there was no significant correlation between knowledge scores and calcium intake. Chi-squared test (χ^2) showed no association between levels of knowledge and attitude with level of physical activities. This study showed that the respondents had a satisfactory level of knowledge and a positive level of attitude towards osteoporosis but this is not reflected in their calcium intake and physical activities. Hopefully, this study will help those who may be concerned with the implementation of health education programmes among nurses and to update the nursing training module so that issues on osteoporosis will be given adequate emphasis in the future.

B16 Blood glucose responses after eating one serving of fruits in healthy young Malay adults

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This randomised cross-sectional study was carried out to determine the blood glucose responses after consuming 3 types of fruits: banana, papaya and watermelon. Twelve healthy young Malay adults (6 men and 6 women) aged between 20 to 23 years old, with normal range of Body Mass Index (BMI), participated in this study. Simple randomised sampling was done among Malay students in Faculty of Allied Health Science, UKM Kuala Lumpur. Mean age and BMI of the subjects are 21.42 ± 1.31 years old and 21.0 ± 1.44 kg/m², respectively. The study subjects consumed 3 types of fruits, banana, papaya and watermelon, plus a reference food (glucose) after an overnight fasting (10 to 12 hours) on different days. Each test food contained 15 g (one serving) of available carbohydrate in banana (85 g), papaya (211 g) and watermelon (445 g). Finger-prick capillary blood samples were obtained at 0 (fasting), 15, 30, 45, 60, 90 and 120 minutes after consuming the fruits and reference food. The blood glucose values for each subject were used to calculate the area under the glucose curve (AUC); the established method that is commonly used to express glycaemic responses. This study showed that mean peak of blood glucose values was obtained at 30 minutes ($p < 0.05$) for all fruits and glucose. Banana obtained the highest mean peak of blood glucose values (6.1 ± 0.4 mmol/L), followed by papaya (5.7 ± 0.4 mmol/L) and watermelon (5.4 ± 0.4 mmol/L) as compared to glucose (7.3 ± 0.9 mmol/L). Among the fruits, AUC for banana was the highest (83.53 ± 36.2 mmol.min/L), followed by papaya (50.0 ± 28.9 mmol.min/L) and watermelon (49.94 ± 25.7 mmol.min/L). This study showed that glucose had the highest AUC, that is 94.92 ± 24.5 mmol.min/L, compared to all fruits tested. In conclusion, the results of this study could be used as recommendation for diabetics for optimum glycaemic control.

B17 Effectiveness of nutrition education package on knowledge and practice of individuals with high risk of breast cancer

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This study was conducted to determine the effectiveness of nutrition education package on knowledge and practice of high cancer risk individuals. A total of 37 women who have family history of

breast cancer participated in this study. The nutrition education package comprised of a booklet entitled 'Diet & Healthy Lifestyles for the Prevention of Cancer', followed by a dietary advice session. A questionnaire was distributed to the subject before (pre-test) and after receiving the nutrition education package (post-test). Food intake was recorded using 24-Hour Recall before (pre-test) and after receiving the nutrition education package (post-test). The results obtained indicated that the nutrition knowledge score increased significantly from 59.81 ± 2.98 at pre-test to 85.73 ± 1.45 in post-test ($p < 0.05$). The nutrition practice also improved after receiving the nutrition education package. The practice of removing the skin from chicken significantly increased from 67.6% to 89.2% ($p < 0.05$). There were also a significant difference in nutrition practice for removing the fat from meat before and after receiving the education package, from 78.4% at pre-test to 94.6% in post-test ($p < 0.05$). The daily intake of fruits significantly increased from 24.3% to 27.0%. The study also showed a difference in the choice of snacks taken by the subject before and after receiving nutrition education package. 24.3% of subjects choose heavy snacks and junk food before receiving the package, but then changed to fruits (40.5%) after receiving the package. There was also a significant reduction to 2 tsp cooking oils consumed, from 48.6% during pre-test to 91.9% in post-test ($p < 0.05$). The food intake of the subject improved after receiving nutrition education package especially in reduction of fat intake. In conclusion, the nutrition education package of high risk individuals changed the nutrition practice and improved the nutrition knowledge.

B18 Nutritional knowledge and eating habits among adolescent athletes in Kelantan: A case study of Silat Olahraga team

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The aim of the study was to examine the correlation of the nutritional knowledge and eating behavior among adolescent athletes in Kelantan. The respondents consisted of 15 males and 15 females aged between 16 and 20 years old who represented Kelantan for Sukan Malaysia 2004. In this descriptive study, the respondents were asked to complete a set of CANKAP questionnaire (Comprehensive Assessment of Nutrition Knowledge, Attitudes and Practices). Results showed that male respondents had significantly higher mean scores on nutrition knowledge questions than females, with respective scores of 50.6% and 39.7%. Similarly, results also indicated that the respondents from urban areas scored significantly higher for the nutrition knowledge questions than those from rural areas, with mean scores of 52.3% and 42.6% respectively. In terms of eating habits, the results also showed a significant difference between eating behavior scores for males and females, with respective mean scores of 32.5% and 31.4%. Pearson Correlation Coefficient also showed that there was a strong relationship between nutrition knowledge and eating habits of the surveyed subjects ($r = 0.740$, $p < 0.01$). In conclusion, the adolescent athletes are in great need of nutrition education or counseling to ensure that they always practise sound eating habits for their optimal health as well as sports performance.

B19 Diet and lifestyle guidelines for cancer prevention: knowledge, attitudes and practices among rural adults in Gopeng, Perak

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This study was conducted to assess diet and lifestyle related knowledge, attitudes and practices for cancer prevention among rural adults. Fifty male and 85 female subjects participated in this study.

The guidelines used were the World Cancer Research Fund Diet and Health Recommendations (WCRF, 1997). The mean age of the subjects was 39.56 ± 13.33 years. The average years of education was 9.56 ± 3.49 years. Mean monthly household income of the respondents was RM1344.74 \pm 750.12 per month. The results showed that approximately 72.6% of the respondents have moderate knowledge scores and 26.7% were in the high knowledge category. For attitude, 87.4% obtained high scores. For fruit and vegetable intake, 60.7% of the respondents were in the unsatisfactory category with intake of <400g/day. For daily fat intake, 95.6% of the respondents were in the satisfactory category with intake =30%kcal.; for red meat consumption, 96.3% were in the satisfactory category with intakes <80g/day; for plant based foods, 60.0% met the guidelines with intakes of >600g/day and nearly 76% met the guidelines for daily salt intake of <6g/day. The results also show that 24.7% of the female and 14% of male respondents took dietary supplements. Approximately 44.0% of the male respondents and 2.4% of female respondents are smokers. All the respondents walk regularly as a form of physical activity. The mean duration of walking was 185.00 ± 283.23 min/week which is much lower than the one hour brisk walk daily guideline of WCRF. The results revealed significant relationships between i) knowledge scores with years of education ($r=0.395$, $p=0.000$), age ($r=-1.90$, $p=0.028$), and total income ($r=0.0249$, $p=0.004$); ii) knowledge scores and attitudes ($r=0.440$, $p=0.000$). No significant correlations were obtained between knowledge and attitude with intake of fruits and vegetables, fat, plant-based foods, red meat and salt intake, except for attitude which had a weak but significant correlation with intake of plant based foods ($r=-0.186$, $p=0.031$). In conclusion, the knowledge level of the respondents is moderate but they have a good attitude towards cancer prevention. Older adults have lower knowledge levels. Subjects' dietary practices especially their intake of fruits and vegetables and physical activity level need to be improved. Therefore, cancer preventive education on diet and lifestyle practices is recommended for this community especially for the older adults in order to increase their knowledge, improve their behaviour and in the long term reduce their risk for cancer.

B20 Development of a nutrition and lifestyle educational intervention for cancer prevention: effect on knowledge and physical activity

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According to the National Cancer Registry of 2002, 1 in 5 Malaysians can be expected to develop cancer in his/her lifetime. What is underappreciated is that cancer is a largely preventable disease. The objective of this study is to develop and test an educational package on diet and lifestyle guidelines for cancer prevention. The guidelines have been adapted from the World Cancer Research Fund (WCRF) / American Institute for Cancer Research (AICR) guidelines to suit the Malaysian context. The package includes an informational booklet, an FAQ on cancer prevention, a video presentation for public viewing and a lecture series on PowerPoint. The primary aim of this package is to improve knowledge and to promote healthful behaviours for cancer prevention among UPM employees. In Phase 1, we developed a user/reader-friendly informational booklet in Bahasa Malaysia with messages in nontechnical language. This booklet is supported by a series of lecture presentations on PowerPoint on each of the guidelines contained in the booklet. In Phase 2, we carried out baseline studies on cancer-related nutrition knowledge, attitudes and practices on a randomly selected group of UPM employees ($n=110$) who were randomised into a control ($n=55$) and intervention group ($n=55$). In Phase 3, we implemented the intervention. The intervention group received the booklet and lectures every week for 4 weeks continuously, while the control group received only the booklet. In the fifth week, messages were reinforced with posters. In the sixth week, telephone counseling was given to the intervention groups to further motivate changes. Knowledge scores increased significantly in both males and females after the intervention. The

intervention group had significantly higher scores than the control group for knowledge after 6 weeks ($p < 0.05$). In addition the intervention group significantly improved in their physical activity levels in comparison to the control group ($p < 0.05$).

B21 Study of knowledge, attitudes, and practices during fasting month amongst diabetes mellitus type 2 patients at outpatient clinic, Hospital Besut, Terengganu

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A study was conducted to assess the level of knowledge, attitudes and practices towards Diabetes Mellitus Type 2 during fasting month amongst diabetic patients at Outpatient Clinic, Hospital Besut, Terengganu. Of the total of 60 respondents, 25 respondents were men and 35 respondents were women. The respondents aged between 40 and 65, Malay ethnic and fasting during Ramadhan were selected by purposive sampling. Data were collected through personal interview using questionnaire and dietary intake was recorded by 24-hour dietary recall. The questionnaire includes knowledge, attitudes and practices aspects. Measurements of anthropometric and blood glucose levels were taken from secondary data during this study. Data were collected and analysed using the computer programme Statistical Packages for Social Sciences (SPSS) version 12.0. The results showed that the mean BMI respondents were 25.99 ± 5.00 kg/m². The mean of body weight changes declined about 1.62 ± 4.01 kg and the mean of blood glucose level changes declined by 0.31 ± 4.47 mmol/L. It was noted that the mean score for knowledge was 76.08 ± 12.79 whereas the mean score for attitude was 62.80 ± 8.85 . According to the knowledge and attitude scores, the level of knowledge and attitude related to Diabetes Mellitus Type 2 during fasting month amongst respondents were satisfactory. Pearson's Correlation Coefficient Test showed that there was no significant difference between knowledge and age respondents ($p > 0.05$, $r = -0.85$). There also no significant difference between knowledge and gender ($p > 0.05$, $r = -0.144$). However, there was a significant difference between knowledge and year of education ($p < 0.05$, $r = 0.329$). There was also a significant difference between knowledge and salary respondents ($p < 0.05$, $r = 0.391$). Besides that, there was a significant difference between knowledge and attitude of respondents towards diabetes ($p < 0.05$, $r = 0.506$). Chi Square analysis showed no significant difference between knowledge and attitude with nutritional practices of respondents ($p > 0.05$). T test showed that there were significant differences in the body weight of respondents before and after fasting ($p < 0.05$, $t = 3.116$). However, no significant differences in the blood glucose level of respondents were found before and after fasting ($p > 0.05$, $t = 0.543$). This study showed that with good knowledge, a positive attitude and practices can develop. In conclusion, a majority respondents have satisfactory levels of knowledge, attitudes and practices. Fasting practices during Ramadhan will not affect the diabetic patients.

B22 Validation of a food frequency questionnaire (FFQ) against dietary history questionnaire (DHQ) among Malay adults

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The purpose of this study was to validate the dietary intake of Malay adults using the food frequency questionnaire (FFQ) and diet history questionnaire (DHQ). FFQ is an interview-administered questionnaire consisting of 117 items whereas DHQ consists of a pre-coded dietary

history with a qualitative FFQ. A total of 70 Malay subjects (35 men and 35 women) aged between 20 and 59 years old residing in Seremban and Rembau District, Negeri Sembilan volunteered to participate in this validation study. Statistical analyses carried out to determine the agreement were mean difference and percent of mean difference, Wilcoxon's test, Spearman rank correlation, cross classification analysis and Bland-Altman plot. The results showed that there was a weak agreement between the two methods. Both methods were also calibrated against proxy for biomarker, the energy intake/basal metabolic rate ration (EI/BMR). The percent mean difference for most nutrients was >10%. However, there was good agreement for carbohydrate (both sexes), calcium (male subjects) protein, vitamin A, vitamin B1 and vitamin B2 (female subjects) with percent of mean difference <10%. Spearman rank correlation showed significant difference ($p < 0.01, 0.05$) with moderate correlation ($r = 0.240 - 0.635$) for energy and macronutrient except for protein in male subjects. Cross classification analysis indicated that 31.4% to 57.1.4% was correctly classified (%CC) whereas 0% to 11.4% was grossly misclassified (%GM). Bland-Altman plot also showed weak agreement due to the increase of estimated value difference and moved far from zero with increment of average energy and macronutrient intake. Comparison of both FFQ and DHQ with EI/BMR ratio showed that 60% to 74% of subjects reported normal data. FFQ tends to overestimate whereas DHQ is likely to underestimate dietary intake. Based on these results, it was concluded that further validation studies are needed using other populations to indicate error that may arise.

B23 The estimation of portion sizes of Malaysian vegetables by young adults using photographs

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Food photographs are two-dimensional portion size measurement aids which serve as a visual cue for recalling and estimating portion sizes of foods. An "Album On Portion Sizes of Malaysian Foods" was developed for the National Food Consumption Survey of the Ministry of Health (2002/2003). This study was carried out to investigate the use of photographs of vegetables in the album in enhancing portion size estimation. Eighty UPM students participated in this study through convenient sampling. The vegetable samples were cut and displayed in the same manner as shown in the photographs. Each subject was required to observe the displayed sample for as long as he/she liked and then estimate the portion size as a fraction, multiple or percentage of the amount shown in the photographs which was then converted to grams. There were 2160 estimation responses by 80 subjects for 28 vegetables. Of these responses, 77.6% were correct estimations ($\pm 10\%$ of actual weight), 11.6% were overestimations ($>10\%$ of actual weight) and 10.8% were underestimations ($<10\%$ of actual weight). The vegetables most frequently correctly estimated were tomato slices (91.3%), shredded cabbage (88.7%), bitter melon (87.5%), half-cut lady's fingers (85.0%) and small-cut lady's fingers (85.0%). The most frequently overestimated vegetables were half-cut round brinjal (32.5%) and four-angle bean (25.0%). Vegetables that were most frequently underestimated were cucumber (31.3%), large lady's fingers (27.5%), water convulvolus (22.5%) and spinach (22.5%). No significant difference between actual and estimated weights by all subjects was found for bitter melon, large lady's fingers, lady's fingers cut into half, small-cut of lady's fingers, broccoli, long-cut of baby corn, baby corn cut into small, cabbage, cauliflower cut into small pieces, small-cut of tomato, tomato slice and selom leaves. Male and female subjects did not differ significantly in portion size estimation for all vegetables except for bitter melon. No significant correlations were observed between BMI and portion size estimation of all but four vegetables which were petola, bitter melon, half a round brinjal and large lady's fingers. No correlation was found between duration of time for observation with the degree of accuracy in portion weight estimation for all vegetables except for bitter melon. The photographs of Malaysians fruits are useful for the correct

estimation of portion sizes of more than three-fourths of the vegetables in the album. Predisposing factors such as gender, BMI and observation time do not influence accuracy of estimation. These photographs should be tested in older adults who may be more representative of the population studied in the National Food Consumption Survey.

B24 Assessment of nutritional status of Diabetes Mellitus Type 2 Chinese Patients in Ipoh, Perak

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The objective of this study was to evaluate the nutritional status of Diabetes Mellitus (DM 2) Chinese patients. A total of 34 males and 36 females who were DM 2 patients aged between 42 and 84 years old were selected by purposive sampling method. The demographic data and socioeconomic characteristics of respondents, anthropometric measurements, health status, food practices and nutrient intakes were taken. Data were collected using a set of questionnaire, *TANITA* electronic weighing scale, *SECA bodymeter* and a measuring tape. Food intakes of respondents were collected using 24-Hour Dietary Recall and Food Frequency Questionnaire (FFQ). The data were analysed using Statistical Package for Social Sciences (SPSS) version 12.0 and the Pearson Correlation Coefficient test was used to test the relationships between dependent and independent variables. The overall socioeconomic status of respondents was low as the mean number of educational years was only 6.44 ± 3.94 years and the mean monthly household income was RM 1012.36 ± 780.67 . There were 57.1% of respondents with normal Body Mass Index (BMI), pre-obese (28.6%), first class obesity (8.6%) and underweight (5.7%). The mean BMI for males was 23.92 ± 3.85 kg/m² and mean BMI for females was 23.92 ± 3.85 kg/m², which were categorised as normal. The mean Waist-Hip-Ratio (WHR) for men was normal (0.94 ± 0.07) compared to that of females (0.88 ± 0.06), indicating that female respondents had abdominal obesity. The mean fasting blood glucose levels were higher than normal, which were 9.05 ± 2.62 mmol/L for males and 9.16 ± 2.03 for females. The results also showed that the energy intake (1572 ± 566 kcal for males, 1333 ± 345 kcal for females), energy derived from carbohydrate (804 ± 292 kcal for males, 727 ± 197 kcal for females) and energy derived from fat (398 ± 215 kcal for males, 307 ± 148 kcal for females) of respondents failed to meet the dietary recommendations. However, protein intake of respondents exceeded the recommendation (79.60 ± 34.39 g for males, 62.31 ± 20.38 g for females). The results of Pearson Correlation Coefficient test showed that there was no significant relationship between socioeconomic status and BMI and WHR of respondents. The study also revealed that there was no significant relationship between nutrient intakes and BMI and WHR of respondents. The results also showed that there was no relationship between nutrient intake and fasting blood glucose levels. In conclusion, the overall nutritional status of respondents was found to be unsatisfactory. DM patients should be counseled to make healthier food choices and practise active lifestyles in order to improve their nutritional status and hence reduce hyperglycaemia so that DM complications can be avoided or reduced.

B25 Acceptance of mousse and milk shake made from Peptamen Junior among paediatric oncology patients at University Malaya Medical Center

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Adequate nutrition is an important concern in children with cancer. The type of food given to them should be appealing, attractive and palatable especially during chemotherapy because a majority of them lose their appetite due to nausea, vomiting and diarrhoea. This study was conducted to determine the acceptability of the nutrient-dense snack made from Peptamen Junior. These snacks were prepared from Peptamen Junior. Peptamen Junior is a semi-elemental and complete balance formula. It contains MCT and pre-digested protein. This product is indicated for paediatric patients with malabsorption problems, crohns' disease and also for cancer patients. This product has a bitter taste and to attract children to accept this product, it was developed into a mousse and a milk shake, by adding colour and flavour to make it tastier and more attractive. They sampled 2 snacks: mousse with added strawberry flavour, and milk shake with added orange flavour. Sensory analysis was conducted individually among 30 oncology paediatric patients from University Malaya Medical Center, aged between 1 and 14 years. Explanation on rating the evaluation form was given to patient and guardian. The snacks were sampled one at a time. Plain water was given before and after each sampling of snacks. Eleven attributes were rated; they were aroma, colour, tastiness, sweetness, sourness, bitter taste, creaminess, texture, appearance and overall taste. The snack acceptance was determined using face scale of 1 to 5. The score of 1 being extremely dislike, 2 being dislike, 3 being not sure, 4 being acceptable and 5 being like very much. Analysis was done using SPSS software version 11.0. The result showed that 83.3% of patients liked the mousse while 46.7% of patients liked the milk shake. ANOVA showed that the mousse and milk shake were similar in acceptance ($p > 0.05$). In conclusion, Peptamen Junior is well accepted by paediatric oncology patients when flavour is added.

B26 Children class performance: nutritional contributing factors, consequences and intervention

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Children's class performance has been of great concern to the nation. This research is done to determine its contributing factors, one of them being nutrition intake. This research was carried out on the Bum-Bum Island, Kampung Tagasan, Kampung Kabongan, and Kampung Sugaya, which are situated in the district of Semporna, Sabah. The total number of respondents was 825, between the age of 12 and 16 years old, consisting of 435 (52.7%) UPSR students and 390 (47.3%) PMR students. The objectives of the research were to measure the nutritional status, and to identify the correlation between students' academic performance with daily food intake and anthropometry measurement. The Body Mass Index, questionnaires on demography, dietary history, medical history, and food practices were used as the instruments for this research. The results showed that there is a significant difference of ($P < 0.05$) the class performance among the UPSR students, and that there is a correlation between BMI and examination results. But there is no significant difference or correlation between the BMI of PMR students and examination results. As for the dietary intakes of UPSR

and PMR students, their dietary intake was less than recommended; for UPSR students, it was carbohydrate (19.46 ± 0.92), protein (11.77 ± 0.76), and fat (8.19 ± 0.53), and for PMR students, it was carbohydrate (20.95 ± 0.99), protein ($11. \pm 0.77$) and fat (8.64 ± 0.58). Results also showed that majority of the students were malnourished, with 514 (63.3%) with a BMI 16.0-19.0. 203 (24.6%) had problems associated with malnutrition, with a BMI <16. About 84 (10.2%) of them had ideal BMI 20-24.9, 14 (1.7%) respondents had obesity grade I (BMI 25-29.9), and only 4 (0.48%) of them were obese grade II with a BMI >30. The consequences were that lacking nutrients, their PMR results were poor as compared to UPSR results. The suggested intervention is to provide school meals for PMR students of low socioeconomic status in Semporna.

B27 Determination of vitamin E content and fatty acid composition in selected foods and assessment of the adequacy of intake among army trainees

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The purpose of this study was to determine the vitamin E content and fatty acids composition in foods served to army trainees in Pusat Latihan Asas Tentera Darat (PUSASDA) and to assess the adequacy of dietary intake. HPLC and GC methods from American Oil Chemistry Society (AOCS) were used for the analysis of 22 foodstuffs divided into 6 groups: cereal and cereal products, fats, eggs and poultry, fish, vegetables and fruits, and miscellaneous. The content of vitamin E in foods being analysed varied from 0 mg in cooked rice to 11.76 mg vitamin E in ikan kembung asam pedas. The richest sources of vitamin E were foods that used palm oil in cooking. The predominant SFA, MUFA and PUFA in food analysed are palmitic acid, oleic acid and linoleic acid, respectively. Vitamin E and fatty acid intake among 84 army trainees were assessed based on food analysis and calculation from UK Food Composition from a one-day food record. The contributions of SFA, MUFA and PUFA from total energy based on calculations were 12.1%, 8.3% and 3.0% respectively. Whereas, according to the food analysis, the intakes were 6.2%, 6.0% and 2.0% from total energy for SFA, MUFA and PUFA, respectively. Vitamin E intake in subjects were 8.37 mg/d and 11.68 mg/d based on calculation and food analysis, respectively. Approximately 99% and 96% of subjects did not meet the vitamin E recommendations according to the FAO/WHO and Malaysian RNI, based on calculation and food analysis, respectively. In conclusion, the intake of both vitamin E and fatty acids of the subjects were not satisfactory. It seems that vitamin E intake may be underestimated when using the food composition alone.

B28 Obesity among Children: are we feeding the wrong food?

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High fat foods are one of the contributing factors in obesity. At home or outside, dishes that are usually served are either fried, fried in chilly paste or cooked in curry. In light of the evidence, this study was carried out to identify the fat energy and the amount of fat absorbed in several main courses and *kuih*. The main courses selected were those that were usually sold at food stalls, cafeterias and restaurants around the Klang Valley. They included *ayam goreng sambal*, *ayam goreng*,

chicken curry (with and without coconut milk), *ikan goreng sambal*, *ikan goreng*, fish curry (with and without coconut milk), fish *pindang* and grilled fish while the *kuih* were curry puffs, *keropok lekong* and *pisang goreng*. These dishes and *kuih* were cooked 3 times on different days. The recipes for the dishes were from cookbooks and were standardised prior to cooking. Curry puffs were purchased frozen; *keropok lekong* was purchased fresh from the supplier while the batter for the *pisang goreng* was from a ready mixed powder. Fat, protein, ash and moisture were determined by proximate analysis while carbohydrate was by difference. The *kuih* were deep-fried according to the recommended temperature and cooking time. The result of the study showed that a *goreng sambal* dish: i.e. *ayam goreng sambal* and *ikan goreng sambal* absorbed about 10.0% and 15.3% fat respectively, while the regular fried dish; i.e. *ayam goreng* and *ikan goreng* absorbed about 7.6% and 13.5% fat respectively. The fish or chicken cooked in gravies did not absorb the fat from the gravies and this can be seen with the curry and *masak pindang* dishes. As for the *kuih*, *keropok lekong* absorbed the highest amount of fat followed by curry puffs and *pisang goreng*. In conclusion, when planning meals for the family, one must incorporate variety in the cooking methods. These dishes and *kuih* have been, and will be around, for a long time. The recommendation of *Makan Banyak*, *Makan Sederhana*, *Makan Sikit* by the Ministry of Health is still good to practise.

B29 Relationship between calcium intake and physical activity with bone health status among Chinese children

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A cross-sectional study was carried out to study the relationship between calcium intake and physical activity with bone health status among Chinese children. A total of 72 children aged 11 participated in the study. Subjects comprised of 48.6% males and 51.4% females. A set of questionnaire was used to assess demographic background, dietary habits and physical activity, and a semi quantitative food frequency questionnaire was used to assess calcium intake among respondents. Body weight and height were measured by using TANITA electronic weighing scale and SECA microtoice tape. Bone health status was measured by using ultrasound machine QUS-2™. Data were analysed using the Statistical Package for Social Sciences (SPSS) version 12.0. Mean calcium intake was 480.8 ± 318.9 mg per day. About 20.8% of the respondents consumed more than the Malaysian RDA for calcium intake. Mean physical activity was 31.3 minutes/day. Half of the respondents (50.0%) were considered as moderately active, 37.5% were highly active and the rest (12.5%) were sedentary. The mean for Broadband Ultrasound Attenuation (BUA) and T-score were 67.72 ± 7.77 dB/MHz and 2.04 ± 0.46 , respectively. According to T-score classification, 8.3% were classified as normal, 79.2% were osteopaenic and 12.5% were osteoporotic. Pearson Correlation test indicated that there were no significant correlations between T-score and calcium intake ($r = 0.10$, $p > 0.05$) and BMI ($r = 0.09$, $p > 0.05$). The Spearman Correlation test showed that there was no significant correlation between physical activity level and T-score ($r = -0.13$, $p > 0.05$). The independent t-test showed that there were no significant differences in mean values of T-score ($t = 0.547$) and BUA ($t = 0.551$) between male and female respondents. In conclusion, dietary calcium intake, physical activity level and bone health status among respondents were considered unsatisfactory. Therefore, appropriate intervention programmes should be implemented in order to improve their dietary calcium intake and physical activity level.

B30 Development of food frequency questionnaire (FFQ) for adult population in Ranau district of Sabah

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This study aims to develop an FFQ for the adult population in Ranau District of Sabah. A preliminary study to determine the food items to be included in the FFQ was conducted using one-day 24-hour diet recall method. A total number of 128 subjects comprising 74 females and 54 males with age between 17 to 65 years participated in the preliminary study, with 84.4% subjects from Kadazan Dusun ethnic group. The results from the preliminary study were used to develop an FFQ specific for adult population in Ranau, which included 99 food items in 12 food groups. Food items that contributed 90% or more to energy and macronutrients in the diet of the population were included in the FFQ. Primary food sources that contributed to energy were white rice, various types of noodles, and chicken and chicken-based products. Major food contributors of carbohydrate were white rice and various types of noodles which accumulated to more than 60% of carbohydrate. Main contributors of protein in the population diet were fish, sea food and fish-based products; chicken and chicken-based products; and white rice. Half of the fat in the diet were contributed by chicken and chicken-based products, and various types of noodles. During the preliminary study, meal patterns of the population were also observed. During the basic three meals, breakfast, lunch and dinner, most subjects consumed white rice and vegetables (added with anchovies/salted dried fish/pieces of chicken/meat; stir fried or with gravy). Hot beverages like coffee, cocoa and tea added with condensed milk and/or sugar were usually consumed during breakfast while cordial drinks of various flavours added with sugar were taken during lunch or dinner. Noodles like mee or mee hoon cooked in soup or fried were usually consumed during breakfast or lunch. Protein-rich foods like fish, chicken or meat which were fried, cooked in curry or gravy were served with white rice mostly during dinner when all the family members were around. This FFQ needs to be calibrated before being used to assess the food and nutrient intake of selected populations in rural areas especially in Ranau District. The FFQ can also be used in another rural district of Tambunan.

B31 The effect of milk supplementation withdrawal on bone mineral density of postmenopausal Chinese women in Malaysia

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A randomised controlled trial in 173 postmenopausal Chinese women in Kuala Lumpur showed that milk supplementation was effective to reduce bone loss at the total body, lumbar spine, femoral neck and total hip. The objectives were to determine whether the results were sustained after withdrawal of milk supplementation. A total of 139 participants were followed up for 21 months after the study ended. Bone mineral density (BMD) was measured at the total body, lumbar spine, femoral neck and total hip by dual-energy X-ray absorptiometry. Anthropometric measurements as well as changes in dietary habits were measured. At the follow-up, the milk supplemented group did not show significant bone loss from baseline at most sites (mean \pm SE): total body (0.42 \pm 0.25%), femoral neck (0.44 \pm 0.58%) and total hip (-0.06 \pm 0.46%), unlike the control group: total body

($-1.07 \pm 0.28\%$, $p < 0.005$), femoral neck ($-1.49 \pm 0.56\%$, $p < 0.05$) and total hip ($-0.89 \pm 0.57\%$, $p < 0.05$). However, both the milk and control groups showed bone loss from baseline at the lumbar spine (milk, -2.01% and control, -3.29% , $p < 0.05$). The calcium intake in the milk group remained significantly higher than the control group (milk 710 mg/day and control, 466 mg/day, $p < 0.005$) despite discontinuation of the milk supplement. The results showed that some of the beneficial effects of milk supplement were still evident at follow-up and it was possible to motivate subjects to adopt a positive change in dietary calcium intake after intervention.

B32 Assessment of nutritional status, dietary intake and physical activity of pregnant women during the month of Ramadhan

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This study was conducted to assess the nutritional status, dietary intake and physical activity of Malay mothers during fasting month of Ramadhan. Sixty subjects were selected by convenience sampling from Poliklinik Kesihatan Jaya Gading, Kuantan, Pahang. fasting pregnant women in their second and third trimester were included in the study. Results on anthropometric measurements showed that 36 subjects were anaemic, with haemoglobin level of $< 11 \text{ mg/dl}$. For BMI measurement, 26 subjects were in normal category, 25 subjects were overweight and obese grade I, and 9 subjects were underweight. In terms of weight gain, 19 subjects lost weight during fasting. 34 subjects gained weight and 9 subjects maintained their body weight during the fasting month. On nutrient intake, mean intake of calories was 76.8% of RDA while ferum and calcium were two nutrients with intake lower than 2/3 the Malaysia RDA). In terms of food frequency, foods with the highest score were rice, sweetened condensed milk, chocolate drink and milk powder. Physical activity level of subjects during this fasting month was very low and mean energy balance achieved by the subjects was positive ($90.32 \pm 567.83 \text{ kkal}$) although there was only a small amount of excess energy. 32 subjects had a negative energy balance. The correlation between income with dietary intake showed a significant correlation with riboflavin, ($p < 0.05$, $r = -0.330$). Pearson's correlation test also showed a significant correlation between income and weight gain ($p < 0.05$, $r = -0.28$). The correlation occurred between BMI and total energy expenditure, ($p < 0.05$, $r = 0.756$). The relationship between pre-pregnant BMI and weight gain shows a significant correlation ($p < 0.05$, $r = -0.571$). As a conclusion, this study shows that fasting has some negative effects on pregnant mothers in terms of nutrient intake from diet and weight gain during the period of the study.

Group C: Nutrients and Other Components in Food

C01 Screening of various plant extracts as potential natural dietary antioxidants

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Natural dietary antioxidants from botanical sources are now getting more attention from scientists, manufacturers and consumers worldwide due to the minimal side effects compared to synthetic antioxidants. The objective of this study was to evaluate the antioxidant activity of 11 plant extracts, which are commonly consumed in Asia. Plant extracts were obtained through ethanolic extraction

and the antioxidant activity of the extracts were evaluated using Total Phenolic Compound Determination and Ferric Reducing Power Test. Extracts of Ulam Raja (*Cosmos caudatus*), Kesum (*Polygonum odoratum*) and Tenggek Burung (*Melicope lunu-ankenda*) possessed highest values of phenolic compound compared to the rest ($p < 0.05$). From Ferric Reducing Power Test, Kesum extract exhibited higher ($p < 0.05$) reducing power compared to BHA/BHT (50%-50%) at the level of 200 ppm whereas Ulam Raja extract exhibited similar reducing ability with 200 ppm of BHA/BHT (50%-50%) ($p > 0.05$). In conclusion, Kesum and Ulam Raja extracts showed the most potential as natural dietary antioxidants out of the 11 evaluated plant extracts in this study.

C02 Fatty acid composition of six selected beans

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Legumes are a major source of protein for vegetarians. Others can also benefit from legumes, as they are good sources of fatty acids. The study was carried out to determine the types of fatty acids present and the composition in six selected beans namely peanut, soybean, chickpea, mung bean, adzuki bean and dhal. The beans were purchased from three different places in Klang Valley. Proximate analysis was carried out to determine fat, ash and moisture content in the samples. Fatty acid methyl ester (FAME) was prepared by direct transesterification and the fatty acids were determined by gas chromatography. The results of the study showed that the highest crude fat levels were found in peanut, followed by soybean. The major fatty acids present in the beans were palmitic acid (C16:0), stearic acid (C18:0), oleic acid (C18:1), linoleic acid (C18:2) and linolenic acid (C18:3). Palmitic acid (C16:0) is the predominant saturated fatty acid (SFA) present in the beans. The mung bean has the highest content of palmitic acid (C16:0) that is about 21.2%, while peanut has the highest oleic acid (C18:1) that is about 42.3%. Among the beans, soybean has the highest linoleic acid (C18:2) content which is about 55.7% while mung beans have the highest content of linolenic acid (C18:3) which is about 1.8%. In conclusion, all these six beans contained high levels of linoleic acid (C: 18:2). This information will enrich the current Malaysian Food Composition Table.

C03 Determination of antioxidant capacity and total phenolic content of single and mixed-tropical fruits

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Tropical fruits are important components of a healthy diet, and their protective effects against degenerative diseases are always associated with their antioxidant properties. This study was conducted to investigate the relationship between antioxidant capacity (antioxidant and free radical scavenging activities) of single (papaya, starfruit and watermelon) and mixed-tropical fruits (papaya-starfruit; P+S, watermelon-starfruit; W+S, papaya-watermelon; P+W and watermelon-papaya-starfruit; W+P+S) with total phenolics. The β -carotene bleaching and 2,2-diphenyl-1-picrylhydrazyl (DPPH) assays were used to determine the antioxidant activity and scavenging activity, respectively. Total phenolic content was estimated using a Folin-Ciocalteu reagent assay. Mean antioxidant activity of the studied fruits were in descending order of P+S, P+W, starfruit, papaya, W+P+S, W+S and P+W (69%, 49%, 47%, 36%, 30%, 22% and 19%), respectively. Meanwhile, the scavenging activity was in the order of starfruit, papaya, P+S, W+P+S, W+S, P+W and watermelon (86%, 82%, 63%, 51%, 33%, 32%, and 14%), respectively. The amount of phenolic was estimated to

be in the range of 2 - 0.2 mg/100 g edible portion. There was a significant negative relationship ($r^2 = -0.613$) between antioxidant activity and total phenolic content. However, there is a significant positive relationship ($r^2 = 0.882$) between scavenging activity and total phenolic content in the studied fruits. Based on in-vitro antioxidant assays, the study showed that starfruit, papaya and a combination of both fruits potentially have high antioxidant capacity among the other studied single and mixed-fruits.

C04 A comparison of protein quality between roselle seeds and soya bean

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This study was conducted to compare the protein quality of roselle seeds and soya bean. Previous studies showed that roselle seeds were a new source of protein and it might be comparable with other conventional plant proteins. A semi-micro Kjeldahl method was used to determine the protein content in roselle seeds and soya bean. Protein content in roselle seeds was significantly higher ($p < 0.01$) than soya bean. HPLC Pico-Tag method was used for analysing amino acid composition. Amino acid components in roselle seed were higher compared to soya bean. However, percentage of essential amino acid in roselle seed (43%) was significantly ($p < 0.05$) lower than that of soya bean (53%). The amino acid scores for roselle seeds and soya bean were 26 and 59, respectively. The first and second limiting amino acid found in roselle seeds were threonine and leucine, respectively. The first and the only limiting amino acid found in soya bean was sulphur containing amino acids. Weanling rats were used to conduct the growth and nitrogen balance studies. In the growth study, feed efficiency ratio and net protein ratio of roselle seed were significantly ($p < 0.01$) lower than that of soya bean; while protein efficiency ratio for both samples were not significantly different. In the nitrogen balance study, true absorption, nitrogen balance and net protein utilisation of roselle seed were significantly lower ($P < 0.01$) than that of soya bean; while apparent digestibility, true digestibility and biological value for both samples were not significantly different. The study revealed that the protein quality of roselle seed was lower than soya bean. However, they were not as effective as casein to support growth and nitrogen balance of the rats. The protein quality of roselle seed and soya bean can be improved when they are complemented with cereal-based diets. Therefore, roselle seed may provide a new, inexpensive source of protein for use as a nutritional agent for the food industry.

C05 Determination of selected isoflavones in *bacang*, *kuini* and *bambangan* from different grown locations

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Isoflavones have been reported to play an important role in protecting the body from degenerative diseases. Besides soya bean and its products, there is a dearth of studies on isoflavones content in fruits. Thus, the study was designed to focus on the optimisation of extraction time and HPLC conditions to determine the selected isoflavones namely, daidzein, genistein and genistin content. Three types of *Mangifera species*, namely 'bacang', 'kuini' and 'bambangan' from different locations were selected. Extraction times at 80°C for 30, 60 and 90 min were carried out. Acidified 80% ethanol

was used as an extraction medium for all samples. The optimisation of HPLC conditions was carried out based on different mobile phases, flow rates and columns. HPLC analyses with two flow rates (0.65 and 1.00 ml/min) at 260 nm were used. A HPLC column ZORBAX Eclipse XDB C18 (250 x 4.0 mm, 5 µm) and a mobile phase consisting of acetonitrile-methanol-sodium acetate buffer (10:50:40) were selected for isoflavones analysis. Independent *t*-test and one-way ANOVA test were used to statistically analyse the mean differences between the different extraction times and flow rates, at the significant level of $P < 0.05$. Results showed that 'bacang' had the lowest daidzein and genistin content; while 'kuini' had the highest daidzein, genistein and genistin content. For each *Mangifera species*, there was a significant difference ($P < 0.05$) in the means of daidzein, genistein and genistin. The isoflavones contents increased as the extraction time increased. For each isoflavone tested, there were no significant differences in the means of genistein in 'bacang' Gelok, 'kuini' Jelempek, 'kuini' Jalan Pauh and 'bambangan' Sarawak at flow rate of 0.65 ml/min. Different flow rates applied in HPLC analysis also showed significant differences ($P < 0.05$) among the fruits. The flow rate applied in HPLC analysis was an important concern as the means of isoflavones altered significantly. The study demonstrated that a XDB C18 column, flow rate at 0.65 ml/min, acetonitrile-methanol-sodium acetate buffer (10:50:40) mobile phase and 90 min extraction time were the suitable conditions for analysing isoflavones in the studied *Mangifera sp.* The optimisation conditions that resulted from this study could be used by the analyst to produce more isoflavones data for National Food Composition Table.

C06 Determination of selenium content in selected freshwater fish and marine fish that is found in Malaysia

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There is a lack of information on the selenium content in foods from Asian countries including Malaysia. This information is important for estimating selenium intake. Fish is an important source of protein and its selenium content is generally high. However, it is not known whether marine and freshwater fish available in Malaysia have high selenium content or not. Thus, this study was undertaken to compare the selenium content in several varieties of marine and freshwater fish commonly consumed in Malaysia. Selenium content was determined in 13 types (9 families) of marine fish, and 9 types (8 families) of freshwater fish. Fish samples were purchased from Serdang Jaya night market by convenient sampling. Determination of selenium content in duplicate samples for each fish type was by the flame-atomic absorption spectrophotometer after digestion with nitric acid and hydrochloric acid in the microwave oven (Grajzar *et al.*, 1994). Quality control test was done using standard selenium solution to ensure accuracy of the analysis. The mean selenium content of the marine fish (expressed in mean \pm SEM) was between 9.19 ± 1.36 µg/100g and 61.93 ± 2.37 µg/100g. The mean selenium content in freshwater fish ranged from not detected (ND) to 2.18 ± 0.02 µg/100g. Thus, in comparison, the mean selenium of freshwater fish is lower than marine fish. This difference is significantly different at $p < 0.05$. Consumption of 100 g of marine fish from the family Carangidae, Centropomidae and Nemiteridae (common name: big-eye scad, yellow-banded scad, torpedo, seabass and rosy threadfin bream) can provide approximately 2/3 of the daily requirement of selenium, taken as 55 µg/day for men and women (Food and Nutrition Board, 2000). Adequate selenium intake can reduce the risk of Keshan disease, Kashin-Beck disease, cancer, cardiovascular disease and viral infection. Thus, marine fish intake is encouraged to be consumed not only for its protein content, but also for its selenium content.

C07 Determination of antioxidant capacity and components in *Mangifera sp.* fruits

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This study was aimed at evaluating the antioxidant capacity (total antioxidant and free radical scavenging activities) and components (vitamin C, β -carotene and phenolics) of *Mangifera sp.* from different grown locations. Six types of *Mangifera sp.* namely 'Chokanan' and 'Honey Maha' (mango) (*M. indica*), 'Jelempek' and 'Jalan Pauh' (kwini) (*M. odorata*), 'Pekan Atap' and 'Kg. Aceh' (bacang) (*M. foetida*) were analysed. The β -carotene bleaching and 2,2-diphenyl-1-picrylhydrazyl (DPPH) assays were used to determine the antioxidant capacity. The highest antioxidant activity of 41% was found in 'bacang' Kg. Aceh. 'Kwini' Jalan Pauh (74%) showed the highest free radical scavenging activity among the studied fruits. Total phenolic content was determined according to Folin-Ciocalteu assay, while β -carotene and vitamin C were estimated using a reversed-phase HPLC technique. The content of the antioxidant components ranged from 545 to 655 mg GAE/100 g edible portion for total phenolic, from 2122 to 13562 $\mu\text{g}/100\text{g}$ for β -carotene and from 12 to 48 mg/100g for vitamin C. The study showed that different types of *Mangifera sp.* grown from different locations exhibited varying degrees of antioxidant capacity and components. Moreover, the antioxidant capacity of these fruits could be due to the quantity and quality of antioxidant components present. The study indicated that 'bacang' and 'kwini', which are underutilised, have the potential to be promoted along with commercial and exported Malaysian fruits due to a high amount of antioxidant capacity and components.

C08 Comparison of total dietary fibre, insoluble dietary fibre and soluble dietary fibre contents in raw and cooked green vegetables

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The study was conducted to determine the total dietary fibre (TDF), insoluble dietary fibre (IDF) and soluble dietary fibre (SDF) contents in raw and cooked forms of green vegetables using enzymatic-gravimetric AOAC 991.43 method. Four types of green vegetables used in this study were kale, swamp cabbage, spinach, and mustard. The dietary fibre contents in these vegetables were determined in raw and cooked (stir-fry) forms. Results showed that raw kale contained the highest content of TDF (0.68 ± 0.04 g/100 g sample), IDF (0.58 ± 0.01 g/100 g sample) and SDF (0.10 ± 0.03 g/100 g sample) compared to other raw vegetables. Cooked mustard contained the highest content of TDF (1.24 ± 0.07 g/100 g sample) and IDF (1.15 ± 0.04 g/100 g sample) while cooked kale contained the highest contents of SDF (0.21 ± 0.06 g/100 g sample) compared to other cooked vegetables. This study found that there was an increment of TDF, IDF and SDF contents in all types of cooked vegetables compared to the raw form. The TDF contents in cooked vegetables increased significantly ($p < 0.05$) from the one in raw form for all green vegetables used. There was a significant increment ($p < 0.05$) in IDF content for all types of green vegetables except cooked kale. Cooked swamp cabbage showed the highest increment in both TDF (from 0.39 to 1.05%) and IDF (from 0.37 to 0.98%) contents. Meanwhile, there was no significant difference ($p > 0.05$) in SDF contents for all types of green vegetables except cooked mustard. Cooked spinach showed the highest increment in SDF content (from 0.02 to 0.11%). In conclusion, cooked (stir-fry) vegetables contained more TDF, IDF and SDF compared to raw vegetables in all four types of green vegetables used in this study.

C09 Determination of macronutrients and mineral contents in three selected commercial cooked rice in Malaysia

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This study was conducted to determine and compare the contents of macronutrients and minerals in three types of selected commercial cooked rice in Malaysia. The selected rice for this study was milled, aromatic and ponni rice. The rice was cooked according to the proper measurement of water to rice before it was dried and analysed. The macronutrients were determined by using proximate analysis (AOAC method), available carbohydrate was determined by Anthrone method, total dietary fibre (TDF) content was determined by using AOAC 991.43 method and mineral contents were determined by using Atomic Adsorption Spectrophotometer. The proximate analysis showed all samples contained 58.58 - 75.37 % total moisture, 22.46 - 38.20 % total carbohydrates, 2.00 - 3.11 % crude protein, 0.11 % total ash and 0.04 - 0.06 % crude fat. The results showed cooked ponni rice contained 22.46±2.7 % of total carbohydrate content which was significantly lower ($p<0.05$) compared to aromatic (38.20±0.70 %) and milled cooked rice (36.80±3.36 %). Available carbohydrate content was highest in cooked aromatic rice (9.10±0.90 %), followed by cooked milled (3.44±0.60 %) and ponni rice (2.03±0.4 %). Cooked milled rice contained 0.43±0.17 g/100g TDF content which was significantly higher ($p<0.05$) compared to cooked ponni (0.22±0.04 g/100g) and aromatic rice (0.12±0.05 g/ 100g). Potassium was the most abundant mineral (35.83 - 48.19 %) whereas iron content (0.17 - 0.36 %) was the lowest in all cooked rice samples. Cooked ponni rice contained 48.19±2.80 % potassium which showed significant difference ($p<0.05$) compared to cooked aromatic (36.05 ± 3.30 %) and milled rice (35.83±2.10 %). Cooked milled rice contained highest ferum content (0.36±0.01 %) followed by cooked aromatic rice (0.24±0.07 %) and ponni rice (0.17±0.04 %). Cooked ponni rice contained 2.74±0.50 % natrium, which was lower compared to cooked milled (3.62±0.70 %) and cooked aromatic rice (2.76±0.80 %). The overall results showed that cooked ponni rice has the lowest content of total carbohydrate, available carbohydrate, ferum, natrium and highest content of potassium compared to other samples.

C10 Phytic acid extracted from rice bran as a natural antioxidant

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Phytic acid or inositol hexaphosphate (IP6) is a 6-phosphate ester of inositol (a bioactive sugar molecule). It is found in high concentrations especially in wheat bran, rice bran and wheat germ. In rice bran, phytic acid is present at 9.5 to 14.5% by weight. Phytic acid was historically considered to be an anti-nutrient but recent reports suggest it may possess various significant health benefits. Thus, this study was aimed at extracting phytic acid and assessing its quality as an antioxidative compound.

Spectrophotometric measurement of phytic acid content result showed that extraction process using 0.8M HCl with shaking and centrifugation produced high contents of the extract (10.28/100g). The sample was then neutralised with NaOH. The antioxidant activity of the phytic acid was then determined by the ferric thiocyanate (FTC), thiobarbituric acid (TBA), β -carotene bleaching and 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging methods. The antioxidant activity was compared with that of synthetic antioxidant, butylated hydroxytoluene (BHT).

One-way ANOVA test at $p < 0.05$ was used to determine the comparison of means between samples. Results show that the total antioxidant activity of phytic acid as measured by β -carotene bleaching, FTC and TBA assay were 87.3 to 97.5%, 74.5% and 40.05% respectively. Data also shows that the total antioxidant measured by FTC, TBA and β -carotene bleaching method were not significantly different with BHT ($p < 0.05$). However, analysis of DPPH assay indicates that phytic acid has low radical scavenging effect, which was in the range of 10.1 to 41.0%. The value was significantly different from that of BHT ($p > 0.05$). In conclusion, this study shows that phytic acid extract is a good antioxidant compound with significant beneficial properties.

C11 Flavonoids content of *Strobilanthes crispus* leaves and extracts by the colorimetric and reversed-phase HPLC method

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Flavonoids are a group of naturally occurring polyphenolic compounds, which are widely distributed in the leaves, seeds, bark and flowers of plants. The beneficial health effects of flavonoids are attributed mostly to their antioxidant and chelating abilities. *Strobilanthes crispus* plant, originated from Jakarta, has been used as a herbal remedy locally and in Indonesia as anti-diabetic, diuretic, hepatitis and cholesterol lowering agents. From earlier work conducted in our lab, catechin, one of the flavonoids group was found to be present in the leaf extract of *Strobilanthes crispus*. This study was carried out to determine the flavonoids content of *Strobilanthes crispus* fresh leaves and dried leaves by the colorimetric method and to quantify the flavonoids content of the dried leaves and extract by the HPLC method. The colorimetric method to determine flavonoids contents utilising aluminium chloride reaction was specific only for flavones and flavonols, while another method utilising 2,4-dinitrophenylhydrazine reaction was specific for flavonones. Therefore, the sum of flavonoids content quantified by these complimentary colorimetric methods, may represent the content of total flavonoids. On the other hand, the reversed-phase HPLC method was used for quantitative determination of four flavonoids, quercetin, kaempferol, luteolin and rutin. The total flavonoids content in *Strobilanthes crispus* fresh leaves and *Strobilanthes crispus* ground, dried leaves were 0.99 ± 0.04 % and 0.46 ± 0.06 %, respectively. From the HPLC method, the highest amount of flavonoids in both *Strobilanthes crispus* ground, dried leaves and *Strobilanthes crispus* crude extracts were quercetin, followed by kaempferol, luteolin and rutin. *Strobilanthes crispus* ground, dried leaves were found to contain 104.55 ± 0.82 μg quercetin g^{-1} and 1.79 ± 1.61 μg rutin g^{-1} dried leaves. Meanwhile, 7.23 ± 0.68 μg quercetin g^{-1} and 0.79 ± 0.72 μg rutin g^{-1} extracts were quantified from the *Strobilanthes crispus* crude extracts. Larger amounts of flavonoids were found in the fresh leaves than in the ground, dried leaves. On the other hand, from the HPLC method, flavonoids level was higher in the ground, dried leaves compared to the crude extract. The differences in the amount of flavonoids might be due to the processing methods applied in order to gain the ground, dried leaves and the crude extracts. These results support the previous study that *Strobilanthes crispus* plant has potential as a natural antioxidant. Further study on the effects of the plant in vivo shall be conducted.

C12 Antioxidant activities of extract from mango (*Mangifera indica* L.) and Guava (*Psidium guajava* L.) and their effect on storage quality of chicken ball

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A study was conducted on four formulations of chicken meat balls to observe the effect of adding water extract from Mango and Guava on the quality of frozen chicken balls (-18°C). The four formulations were chicken ball added with 400ppm *Mangifera indica* L. extract; and 800ppm *Psidium guajava* L.; 200ppm synthetic antioxidant (BHA) and a control. The analysis of total phenolic compound showed that *Mangifera indica* L. had highest phenolic compound at 548.77 µg/100gram fresh weight. Ferum (III) reducing power (FRAP) analysis showed *Mangifera indica* L. extract was able to reduce ferric ions more effectively compared to *Psidium guajava* L. extract (p<0.05). Ferric thiocyanate (FTC) test results indicated that both *Mangifera indica* L. and *Psidium guajava* L. extracts efficiently slowed down the oxidation process compared to the control sample (p<0.05) after seven days of incubation. Control sample had a significantly higher (p<0.05) peroxide value (PV) (3.38meq/kg) compared to the other samples. Thiobarbituric acid (TBA) analysis indicated that the addition of 400ppm *Mangifera indica* L. and 800ppm *Psidium guajava* L. extracts were able to slow down the oxidation process which was similar to 200ppm of BHA.

C13 Determination of lipid oxidation in three selected fried foods: *karipap*, *keropok lekor* and *pisang goreng*

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Lipid oxidation is the main cause of deterioration in foods because it not only affects flavour, odour and colour but also the nutritional value. Thus, this study was carried out to determine the lipid oxidation in *karipap*, *keropok lekor* and *pisang goreng* fried in corn and palm oil. The *karipap* and *keropok lekor* were deep fried for 6 minutes while *pisang goreng* was fried for 4 minutes at a temperature of 180°C. A frequency of 7 frying time was done with 2 days rest in-between. The following tests; Peroxide Value (PV), Thiobarbituric acid (TBA) test and Iodine Value (IV) determined lipid oxidation. The PV and TBA test was done on the extracted oil from the foods while the IV was determined on the cooking oil before and after every frying. The result of the study showed that corn oil undergo unsaturation at a faster rate throughout the frying period compared to palm oil. The PV and malondialdehyde (MDA) concentration in *karipap*, *keropok lekor* and *pisang goreng* fried in both oils were also increased throughout the frying period. However, the foods fried in palm oil had lower PV and MDA concentration compared to those fried in corn oil. As a conclusion, lipid oxidation process is slower in palm oil compared to corn oil. For deep fat frying, palm oil is the recommended cooking oil.

C14 Determination of macronutrients and minerals contents in three selected commercial rice in Malaysia

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This study was carried out to determine the contents of macronutrients and minerals in commercial rice, which consisted of milled, aromatic, and ponni rice. The obtained results were compared to the comparable type of rice in other studies and food composition tables (FCT). Macronutrient contents were determined by using proximate analysis (AOAC method), available carbohydrate was determined using Anthrone method, total dietary fibre (TDF) was determined using AOAC 991.43 and minerals (natrium, kalium, ferum, zinc, magnesium and calcium) contents were determined by using Atomic Absorption Spectrophotometer. The results for proximate analysis showed all rice samples contained 79.48 - 79.85% of total carbohydrate, 11.00 - 12.40 % of total moisture, 7.56 - 8.50% of crude protein, 0.24 - 0.51% of crude fat and 0.28 - 0.51% of total ash. All rice samples contained 0.31 - 1.00 mg/100g of TDF and 7.57 - 41.25% of available carbohydrate. Total carbohydrate contents in all samples were similar ($p>0.05$) and in the range with most results in other studies and FCT. Ponni rice showed the highest content of crude fat (0.51 ± 0.03 %), crude protein (8.50 ± 0.33 %), total ash (0.51 ± 0.02 %) and TDF (1.00 ± 0.13 %) but lowest total carbohydrate (79.48 ± 0.13 %) and moisture (11.0 ± 0.20 %) contents compared to other samples. It also has the lowest content of available carbohydrate from both determinations, using Anthrone and estimation (total carbohydrate-TDF) methods. All rice samples contained lowest content of ferum (0.37 - 0.44 mg/100g) and highest content of kalium (37.17 - 101.54 mg/100g). The magnesium (7.35 - 15.24 mg/100g) and zinc (2.00 - 2.61 mg/100g) contents in all rice samples were in the range with most studies and FCT. Ponni rice contained the lowest content of natrium (9.82 ± 1.99 mg/100g) and highest contents of kalium (101.54 ± 2.34 mg/100g), which showed significant differences ($p<0.05$) compared to other samples. The calcium contents (1.06 - 1.34 mg/100g) in all samples were much lower compared to FCT and other studies.

C15 Chicken curry: a comparison on sensory acceptance between normal weight men, overweight and obese men and working women

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Curry prepared using coconut milk is the most popular dish and is the number one choice of entrée for lunch. Therefore, this study was carried out to compare the sensory acceptance of chicken curry between normal weight men, overweight and obese men, and working women. The subjects were the students and staff of the Universiti Kebangsaan Malaysia and the Institute for Medical Research. The chicken curry dish was standardised in a previous study. This dish was prepared fresh on the day of the sensory test and was warmed prior to the sampling by the untrained taste panelists. About 20gm of gravy and 30gm of chicken was portioned in a bowl and served with 100gm of rice which acts as a carrier. The attributes assessed were aroma, appearance, thickness, sweetness, sour taste, chilli hot, fatty taste, creaminess, oiliness, spiciness and overall acceptance. A hedonic scale of 1 to 5 was used to rate these attributes. A scale of 1 being not acceptable and 5 being extremely acceptable. The results of the study showed no significant differences in sensory acceptance between normal weight men, overweight and obese men and working women for the attributes of appearance, thickness, sweetness, sour, chilli hot, fatty taste, creaminess, oiliness, spiciness and

overall acceptance. However for the aroma attribute, there was a significant difference between the normal weight men and the overweight and obese men. It seems that the normal weight men like their curry to have a more intense aroma. Another attribute that was significantly different among the three groups is the chilli hot attribute. The working women group felt that chilli hotness of the curry was moderately acceptable while both of the normal weight men and the overweight and obese men group felt that the dish was not chilli hot enough. In conclusion, the three groups namely normal weight men, overweight and obese men, and working women had similar acceptance on the chicken curry except for the aroma and chilli hot attribute. This showed that age, body size and gender has an influence on sensory acceptance of curry based on the attributes of aroma and chilli hot.

C16 Antioxidant properties of extracts of Indian Pennywort (*Centella asiatica* L), bitter gourd (*Momordica charantia* L) and lemon grass (*Cymbopogon citrates*) on minced spent hen meat

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Antioxidative compounds in Indian pennywort (*Centella asiatica* L.), bitter gourd (*Momordica charantia* L.) and lemon grass (*Cymbopogon citrates*) were tested for their antioxidant effects on minced spent hen meat stored for 9 days at 4°C. Indian pennywort, bitter gourd and lemon grass were extracted using 95% of ethanol. The total phenolic compound and Ferric reducing power in the extracts of these three plants were analysed. Bitter gourd extract had the most total phenolic compound amongst the rest with 2.264mg/g, followed by Indian pennywort and lemon grass extracts, containing 1.552mg/g and 1.288mg/g respectively. In the test of Ferric reducing power, Indian pennywort extract showed optimum reading at 1400ppm of concentration compared to 2000ppm of concentration recorded by the other two extracts (bitter gourd and lemon grass). The extracts were mixed with minced spent hen meat to test the antioxidant effects contributed by Indian pennywort, bitter gourd and lemon grass on the storage quality of the minced spent hen meat. TBA test and pH test were conducted on the minced spent hen meat every 3 days for 9 days. The result of TBA test showed that minced spent hen meat with bitter gourd extract recorded the lowest reading than the other two extracts. On the 9th day, the minced spent hen meat with bitter gourd extract gave the highest pH, which is pH 6.05. In conclusion, the addition of bitter gourd extract was more effective than the extracts of Indian pennywort and lemon grass in reducing the effects of oxidation in minced spent hen meat.

C17 Determination of antioxidant capacity and total phenolic content of selected regularly consumed vegetables

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Vegetables like four-angled bean (*Psophocarpus tetragonolobus*), french bean (*Phaseolus vulgaris*), long bean (*Vigna sinensis*), snow pea (*Pisum sativum*) and sweet pea (*Pisum sativum*) are common local vegetables that are regularly consumed in raw and cooked forms among Malaysians. Previous studies indicated that these vegetables contain high amounts of antioxidant such as ascorbic acid, carotenoids and other phytonutrients. However, there is a dearth of information on the antioxidant

capacity in these vegetables as well as antioxidant-phytoconstituents such as phenolics. Therefore, this study was conducted to investigate the antioxidant capacity and its relationship to phenolic content. The effect of blanching on the antioxidant capacity and phenolic content was also determined. To determine antioxidant capacity, two in-vitro systems namely β -carotene bleaching and scavenging activity assays were used. Raw long bean had the highest antioxidant activity (85%), followed by four-angled bean (75%), French bean (72%), snow pea (70%) and sweet pea (55%). Following blanching for 10 min, long bean lost the highest antioxidant activity compared to other studied vegetables. Sweet pea had the highest scavenging activity, followed by long bean, snow pea, French bean and four-angled bean (81%, 78%, 61%, 16% and 14%, respectively). Long bean exhibited the highest scavenging activity after 10 min of blanching. Raw sweet pea had the highest phenolic content, followed by snow pea, long bean, four-angled bean and French bean. After 10 min of blanching, long bean lost the lowest phenolic content compared to other vegetables. A significant positive relationship between antioxidant capacity and total phenolic content was found among all vegetables. The study indicated that each type of vegetable had a different antioxidant capacity. Besides other antioxidant-phytoconstituents, this present study may suggest that phenolics could also contribute to antioxidant capacity of these vegetables. Future research is needed to include other antioxidant-phytoconstituents of the vegetables to provide a better correlation between antioxidant capacity and their respective components.

C18 Resistant starch and nutritional composition of legumes with different treatment

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This study evaluated the nutritional composition of three types of legumes commonly found in Malaysia, as well as the amount of resistant starch, which is a fraction of starch that resists digestion in the gastrointestinal tract. The three types of legumes were red bean (*Phaseolus angularis*), mung bean (*Phaseolus aureus*) and chickpea (*Cicer arietinum*). Each type of this legume was given soaking and boiling treatment before the analysis. Nutritional composition of the legumes consist of ash, moisture content, carbohydrate, protein, crude fibre and fat. Resistant starch analysis was done using Berry's Modifiable Method by Goni *et al.* (1996). Ash content is analysed by dry-ashing method and moisture content is using Air-oven method. The methods for analysis of protein, carbohydrates and fat were micro-Kjedahl method, Clegg-anthrone method and Soxhlet method respectively. Crude fibre was analysed using gravimetric method. From the result, it has been found that the content of resistant starch in these three types of legume were not significant ($p < 0.05$). Red bean has been found to contain between 0.68 ± 0.16 and 0.86 ± 0.25 mg/100g of resistant starch while mung bean consists of 0.82 ± 0.21 - 1.04 ± 0.31 mg/100g of resistant starch. The amount in chickpea was between 0.72 ± 0.22 - 1.33 ± 0.09 mg/100g. On proximate analysis, there is a significant difference in the content of ash, moisture, carbohydrate and fat between those legumes after the treatment. The range of ash was between 2.20 ± 0.09 and 3.39 ± 0.24 %, moisture; 9.60 ± 0.72 - 32.5 ± 1.43 %, carbohydrate; 6.30 ± 2.01 - 46.71 ± 1.05 %, and fat in the range of 0.72 ± 0.04 - 6.56 ± 0.91 %. Nonetheless, there is no significant difference in protein and crude fibre after the treatment of the legumes. Protein content was in the range of 2.23 ± 0.17 - 2.56 ± 0.09 g/100g and fat was between 1.69 ± 0.13 and 2.61 ± 0.2 g/100g. This study supports the proposal that cooked legumes can increase the amount of resistant starch which has a beneficial effect on human health.

Group D: Clinical Nutrition

D01 Assessment of nutritional-quality of life of cancer patients in palliative care

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Depletion of nutritional reserves and significant weight loss lead to increased morbidity, decreased quality of life and shorter duration of survival in cancer patients. Fifty-eight cancer patients from 2 palliative care centers in Selangor were recruited with informed consent to assess their nutritional-quality of life (N-QoL) and to identify patients who require nutritional intervention. Subjects were predominantly Chinese (63.8%), with a mean age of 58.43±13.10 years. Nutritional status and quality of life was assessed by two different methods: 1) objective criteria including anthropometry and 24-hour diet recall and, 2) the Patient-Generated Subjective Global Assessment (PG-SGA, Ottery, 1996). The anthropometric measurements were body mass index (BMI), mid-upper arm circumference (MUAC), triceps skinfold (TSF) thickness, and mid-upper arm muscle circumference (MUAMC). PG-SGA N-QoL staging found 18 subjects (31.0%) who were well-nourished, 29 (50.0%) moderately malnourished, and 11 (19.0%) severely malnourished. With the inclusion of physical and functional quality of life domains, 79% of them were identified as having a low nutritional-quality of life (score ≥ 9) and thus require nutritional intervention. As defined by BMI, an equal proportion of subjects (10.3%) exhibited chronic energy deficiency (CED) III and overweight, 12 (20.7%) exhibited CED I-II, 32 (55.2%) normal and obesity (3.4%). TSF and MUAMC were below the 5th percentile in 32 and 22 subjects respectively. Approximately 45% of males and 24% of females had muscle wasting as assessed by MUAC. Twenty six subjects had no weight loss, 16 subjects had weight loss <5% in 1 month while the rest had weight loss >5% in the past 1 month. Mean energy intake met only 62% of requirement. Mean percent contribution of calories from fat (18.8±10.8%) was low. The most frequent symptoms affecting food intake were pain (55.2%), dry mouth (44.8%), and lack of appetite (36.2%). Significant correlations were obtained between PG-SGA scores and MUAC ($r=-0.32$, $p<0.05$), TSF ($r=-0.32$, $p<0.05$), MUAMC ($r=-0.26$, $p<0.05$), weight loss in 1 month ($r=0.33$, $p<0.05$) and 6 months ($r=0.29$, $p<0.05$), and BMI ($r=-0.29$, $p<0.05$). N-QoL groups differed significantly ($p<0.05$) for all anthropometric variables studied including weight loss in the previous 1 month and 6 months. MUAC, TSF, MUAMC, and BMI decreased while weight loss increased from SGA-A (well-nourished) to SGA-C (severely malnourished) staging. This study demonstrates the use of the PG-SGA as a screening tool for assessing the nutritional quality of life of cancer patients as it correlates significantly with objective indicators of nutritional status as well as in the identification of patients who require nutritional intervention. The PG-SGA is recommended as an alternative, quick and easily applied technique for identifying the nutritional-quality of life of cancer patients in routine palliative care.

D02 Postprandial blood glucose responses to white bread and brown bread in mixed meals among healthy Malay individuals

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Bread is usually consumed for breakfast or as a replacement for white rice in main meals. The international table of glycaemic index (GI) has classified white and whole meal bread as high GI foods

which in turn produce the greatest rise in blood glucose. Recently, two commercial breads i.e. white bread (WB) and brown breads (BB) have been represented as a healthy choice for diabetics due to their low GI value when eaten in single meals. For public health purposes, the GI concept should be applied in mixed-meals. Thus, this study investigates the effect of these two breads on the postprandial blood glucose in mixed meals among healthy Malay individuals. The GI value of each test meal was also calculated. In this study, five recipes using WB (WB tuna sandwiches, WB oriental chicken sandwiches, WB roast beef sandwiches, WB fish fillet sandwiches and WB vegetable sandwiches) and BB (BB roast chicken sandwiches, BB sushi sandwiches, BB baked beans, BB vegetable pie and BB apple pie) were developed. Twenty (20) healthy subjects (15 males, 5 females) were selected to participate in this study (mean + SD: 24.4±3.7 years; BMI 23.4±3.0kgm⁻²). After an overnight fasting, subjects consumed the test meals and three repeated tests of reference food (glucose) accordingly. Capillary blood samples were taken at fasting (0min) and 15, 30, 45, 60, 90 and 120min after consumption of test meals. The blood glucose response was obtained by calculating area under the curve (AUC). The GI was determined using the standardised methodology. Blood glucose response after consuming oral glucose was significantly higher than all the test meals. Both WB and BB in mixed-meals could be categorised as low GI foods and no difference was found between each test meal ($p > 0.05$). WB roast chicken sandwiches had the highest GI value i.e. 40 whereas BB sushi sandwiches demonstrated the lowest GI value (21). The GI of WB roast beef sandwiches was 37, followed by WB vegetable sandwiches (36), BB baked beans sandwiches (31), WB tuna sandwiches (30), BB vegetable pie (26), WB fish-fillet sandwiches (24), BB apple pie (23), BB roast chicken (22) and BB sushi sandwiches (21). WB and BB in mixed meals produced a slower rise in blood glucose response and had a low GI value. In addition, the combination of WB and BB with other ingredients that have GI lowering effect would further reduce the postprandial blood glucose response.

D03 Determination of the glycaemic index of selected Malaysian foods

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The glycaemic index (GI) is a classification of the blood glucose-raising potential of carbohydrate foods. There is evidence to support its application to regular diet in terms of benefits for lipid and glycaemic control. Integrating information about the glycaemic index of foods into the Malaysian diet is limited by lack of data. Therefore we determined the GI of individual foods which are rice (beras kilang, species name : *oryza sativa*), noodle rice (kuih-teow, rice product species name : *oryza sativa*), sweet potato (ubi keledak, species name: *ipomoea batatas*), and banana (pisang brangan, species name: *musa paradisiaca*). Twelve healthy adults with a mean body mass index of 21.6 ± 1.6 participated in this study. GI was determined using a standard method with white bread and adjusted relative to glucose. The results showed that the mean GI of rice 90 ± 12 , kuih teow 85 ± 15 , sweet potato 77 ± 12 and banana 55 ± 12 . There were statistical differences in GI and incremental area under the curve values ($p < 0.05$) between the subjects. We conclude that rice, kuih teow and sweet potato are high GI foods, whereas banana is a low GI food. This is the first study to determine the GI of individual Malaysian foods. More research has to be done to determine the GI of many individual Malaysian foods so that a database on Malaysian foods can be created.

D04 Postprandial plasma glucose responses and glycaemic indices of different forms of a large sago meal

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The aim of the study was to determine the postprandial plasma glucose responses and glycaemic indices of three different physical forms of a sago meal. Twelve healthy subjects consumed in random order, three white bread meals and three sago meals (sago porridge, sago paste and sago gel) were given on separate days at least 1 week apart after an overnight fast. Venous blood samples were drawn before and 15, 30, 45, 60, 90 and 120min after the consumption of the bread or sago meals. A 2-way (Meal x Time) repeated measures ANOVA was used to determine the differences in plasma glucose levels between meals over time. A one-way repeated measures ANOVA was employed to determine the differences in the areas under the curve of plasma glucose responses between the sago meals. Plasma glucose following the ingestion of the sago porridge (5.71 ± 0.55 mmol/L) was significantly lower than for the sago paste (6.23 ± 0.75 mmol/L, $p=0.026$) and sago gel (6.59 ± 0.89 mmol/L, $p<0.001$). Collapsed over meals, plasma glucose at 15min (5.84 ± 1.05 mmol/L) was significantly lower than at 30min (7.71 ± 1.32 mmol/L, $p<0.001$), 45min (7.91 ± 0.99 mmol/L, $p<0.001$) and 60min (7.02 ± 1.19 mmol/L, $p=0.008$). The area under the glucose-response curve of sago porridge (209.25 ± 66.32 mmol/L \times min) was significantly larger than that of white bread (126.03 ± 36.26 mmol/L \times min, $p=0.028$), as was that of sago paste (225.38 ± 85.49 mmol/L \times min, $p=0.007$) and sago gel (281.08 ± 118.69 mmol/L \times min, $p<0.001$). However there was no significant difference between the areas under the glucose-response curve between the three sago meals. Glycaemic index values were determined as 100, 166, 179, 223 for white bread, sago porridge, sago paste and sago gel, respectively. It is concluded that ingestion of the sago porridge elicited lower plasma glucose responses compared to sago paste and sago gel.

D05 Determination of glycaemic index of three commercial rice varieties eaten together with curry chicken in local market

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This cross-sectional study was carried out to determine the glycaemic index values for three commercial varieties of rice in the local market of Malaysia, namely white rice, fragrant rice and herbal ponni rice, together with curry chicken cooked without the coconut milk. A total of 8 healthy students from Faculty of Allied Health Sciences comprising of 4 males and 4 females participated in this study. All the subjects were Chinese and aged from 20 to 23 years old. Screening was done using anthropometric measurements such as height and weight as well as questionnaire. Test food serving size was determined by proximate analysis. Subjects were required to consume each type of rice and reference food (glucose), containing 25 g of available carbohydrate respectively on different occasions after 12-hour overnight fast. Finger-prick capillary blood samples were taken at 0 (fasting), 15, 30, 60, 90 and 120 min after consumption of the meal. GI determination was carried out based on the FAO/WHO (1998) protocol. Mean age and BMI of the subjects were 21.3 ± 1.3 years old and 21.6 ± 2.6 kg.m⁻², respectively. All test foods showed significant differences in blood glucose responses after consumption of test meal ($p<0.05$). Glucose had the highest overall Incremental Area Under the Curve (IAUC) followed by fragrant rice, white rice and herbal ponni rice. Likewise, the GI value for fragrant rice (97 ± 10.3) (high GI) ranked the highest among the three test foods.

Meanwhile, the GI values for white rice and herbal ponni rice were 79 ± 12.7 (high GI) and 65 ± 2.8 (intermediate GI), respectively. The finding indicated that there was no significant difference in terms of mean IAUC and fasting blood glucose between age ($p > 0.05$). Relationship between BMI and mean IAUC as well as fasting blood glucose were also studied and no significant difference was found ($p > 0.05$). Overall, herbal ponni rice is more suitable to be recommended for the population compared with other rice tested. This is the first ever study carried out in Malaysia. Further research is needed to determine the GI values of other rice varieties in the local market since rice is the staple food in our country.

D06 Determination of glycaemic index in three types of dumplings with red bean, lotus seeds and chicken curry flavour in the local market

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The purpose of this study was to determine the glycaemic index (GI) of three types of Kart's brand dumplings with red bean, lotus seeds and chicken curry flavour at the local market. Food analysis test was carried out to determine the portion size of test food containing 25 g of available carbohydrate based on proximate method. The subjects of this study consisted of 4 female and 4 male students from the Faculty of Allied Health Sciences, UKM, Kuala Lumpur. All subjects who volunteered in this study were Chinese with the normal fasting blood glucose profile. The mean age for subjects was 21.0 ± 1.4 and the mean body mass index (BMI) was 21.1 ± 2.9 . After 10-12 hours of overnight fasting, capillary blood sample from the subjects was obtained by finger prick. The whole capillary blood glucose was then analysed with glucose oxidase method. Incremental area under the blood glucose response curve (IAUC) of the three test foods and glucose were calculated according to the area of triangle principle and trapezoid rule. The results found that all the test and reference foods achieved peak blood glucose level at minute 45. The results showed there was no significant relationship between BMI with both mean glucose IAUC and mean fasting blood glucose ($p > 0.05$). Results indicated that curry chicken dumpling has a high GI property (80 ± 15.5) followed by lotus seeds dumpling which is a moderate GI food (55 ± 5.1) whereas red bean dumpling was found to be a low GI food (51 ± 3.2). There was significant positive correlation ($p < 0.05$) among water content of the test food with the glycaemic index value. Water percentage of the curry chicken dumpling showed significant differences with the red bean dumpling and lotus seeds dumpling ($p < 0.05$). In conclusion, the red bean dumpling and lotus seeds dumpling could be an alternative food choice and therefore suitable for the diabetic patients.

D07 Nutritional status and effects of high carbohydrate meal consumption on blood glucose profile among UKM squash and badminton players

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This nutritional status combined with blood glucose profile assessments of 13 male players (age: 23.0 ± 2.6 years) in two different types of sports (9 squash and 4 badminton) was conducted during centralised training. Physical characteristics and body composition were determined using anthropometric techniques. The estimation of daily energy intake was assessed by 3-days food record. On

day 1, food intake was recorded based on players' habitual consumption. For day 2 and 3, the nutritional interventions primarily in aspects of daily carbohydrate intake were planned and carried out based on the sport nutrition recommendations. Daily activity pattern to derive energy expenditure was determined by time and motion study, which was carried out simultaneously with food intake record. The blood sample to evaluate the blood glucose profile during 60 minutes training was carried out through finger prick procedure. The results indicated that the mean of body weight and height were 64.0 ± 8.9 kg and 1.69 ± 0.05 m, respectively with the BMI of 22.5 ± 3.9 kg.m⁻². The mean body fat percentage and lean body mass ranged from 6.0 % to 18.7 % and 44.6 kg to 64.8 kg, respectively. The mean of pre-intervention energy intake was 2584 ± 510 kcal.day⁻¹ while energy expenditure was 2904 ± 238 kcal.day⁻¹ with a negative energy balance of 320 kcal. In contrast, post-intervention energy intake was recorded as 3136 ± 292 kcal.day⁻¹ while energy expenditure was 3048 ± 336 kcal.day⁻¹ with a positive energy balance of 87 kcal. Post-intervention daily carbohydrate intake ranged from 6-8 g.kg⁻¹, which was significantly higher than pre-intervention of 4 - 6 g.kg⁻¹ ($p < 0.05$) with the contribution of carbohydrate to total energy intake of 57 % and 51 %, respectively. A biochemical assessment showed that the mean blood glucose level was elevated by the ingestion of 48 g carbohydrate during 60 minutes training. Conversely, plasma glucose gradually declined in the same period without any ingestion of carbohydrate. In conclusion, the intake of carbohydrate during exercise enhanced the maintenance of blood glucose levels despite preventing fatigue. Therefore it may contribute energy to an exercising muscle.

D08 Validity of bioelectrical impedance devices against skinfold thickness measurement through body composition assessment among young women

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The purpose of this study is to validate bioelectrical impedances analysis (BIA) instrument named Bodystat 1500 and Maltron 906 with the use of skinfold thickness measurement as a conventional reference method in body composition assessment among young woman. 84 respondents aged 19 to 28 years were involved in the study which was held at Kolej Tun Syed Nasir (KTSN) UKM campus Kuala Lumpur. All measurements were done on the same day for each subject. The accuracy of skinfold thickness measurement in the first stage of this study shows an acceptable reading where % Coefficient of Variation (CV) and % Technical Error of Measurement (TEM) are below 5% respectively. Body composition assessment including fat percent and fat free mass shows significant correlation between skinfold thickness measurement with Bodystat 1500 (% fat, $r=0.585$ and fat free mass, $r=0.941$) and Maltron 906 (% fat, $r=0.532$ and fat free mass, $r=0.928$). There is also good agreement between methods when Bland-Altman graph was plotted. Bodystat 1500 devices tend to overestimate fat percent and underestimate fat free mass while Maltron 906 devices show the opposite result.

D09 Nutritional assessment of gastrointestinal cancer patient undergoing elective surgery

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Malnutrition is a common problem among gastrointestinal cancer patients undergoing elective surgery. This cross sectional study was conducted in Surgical Department at Hospital Universiti Kebangsaan Malaysia (HUKM) and Surgical Ward Universiti Putra Malaysia (UPM) at Hospital Kuala Lumpur (HKL). Assessment of nutritional status has been done in 34 patients (21 male, 13 female) with gastrointestinal cancer undergoing elective surgery aged between 39 and 77 years old. Nutritional status was assessed by anthropometric measurements (height, weight, TSF and MUAC), 3 days food intake, biochemistry profile (albumin, protein total and haemoglobin) and patient's past medical history. This study showed that 29% of the subjects were underweight while 26% were overweight. Severe malnutrition (less than 10th percentile) was found in 15% (TSF), 9% (MUAC) and 38% (MAMC) of subjects while 6% (MUAC and MAMC) and 3% for TSF experienced over-nutrition (more than 95th percentile). This study also found that food intake of 19% male subjects and 23% female subjects failed to meet the energy requirement. Energy and protein intake for male subjects was 1642 ± 390.6 kcal/day and 1.3 ± 0.5 g/kg body weight/day, respectively. For female subjects, the energy and protein intake was around 1490 ± 275.5 kcal/day and 1.1 ± 0.3 g/kg body weight/day, respectively. Haemoglobin levels of the subjects were below normal values for both male (11.9 g/dl) and female subjects (10.1g/dl). Chemotherapy and radiotherapy treatments have showed a positive and significant relationship ($p < 0.05$) with risks of malnutrition such as gastrointestinal symptoms, loss of appetite and loss of body weight.

D10 Measurement of basal metabolic rate: a comparison between Deltatrac metabolic monitor and Metamax portable system

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The aim of this study is to ascertain the feasibility of using Metamax portable system for the measurement of basal metabolic rate (BMR). The subjects comprised 14 men aged 21 - 23 years with normal body mass index who volunteered to participate in this study. Each subject was measured using two indirect calorimetry methods, namely Metamax portable system and Deltatrac metabolic monitor on the same day. Subjects were measured on two different occasions with an interval of 3 to 21 days. The BMR measured by Metamax (1759 ± 136 kcal/day) were significantly higher than that measured by Deltatrac (1578 ± 132 kcal/day). Wilcoxon tests showed that VO_2 , VCO_2 and BMR measurements were significantly different between the two methods ($p < 0.05$). Spearman correlation ($r = 0.60$, $p = 0.023$) showed that BMR measured with the two methods were moderately but significantly correlated, while Bland-Altman plot showed acceptable agreement between two methods. Although both Metamax and Deltatrac showed relatively good correlation and agreement, Metamax consistently produced higher BMR values due to rather uncomfortable appliances necessary for expired air collection. We would thus recommend that Deltatrac or other suitable metabolic monitors be used for measurements of BMR, while the Metamax and its equivalent portable systems are used for measuring gas exchange only during moderate and active activities.

Group E: Food Science and Technology

E01 Physicochemical characteristics of fish-based baby food

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The aim of the study was to determine the physicochemical characteristics of baby food made from surimi powder from threadfin bream (*Nemipterus japonicus*). Three samples were prepared using oven-dried surimi powder (SO), oven-dried surimi powder without cryoprotectant (SWO) and oven-dried fish (KO). The composition of each treatment was only 13% of total weight. A commercial fish based baby food from cod fish was used as a control (C). The highest protein content was obtained in SWO (19.10%) followed by KO (18.40%), C (17.80%) and SO (15.63%). SWO, SO and KO showed significant differences compared to the commercial baby food product ($p \leq 0.05$) for protein, fat, moisture, ash and carbohydrate content. Density, viscosity, redness and yellowness results showed significant differences ($p \leq 0.05$) but swelling index showed no significant differences ($p \leq 0.05$) between surimi-based baby food compared to commercial instant baby food. However, lightness showed significant differences ($p \leq 0.05$) between SWO and KO compared to commercial instant baby food.

E02 Development of sugar-free mango-flavoured dadih solidified with gelatin

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Dadiah is a soft gel-like traditional milk dessert popular in the northern region of Peninsular Malaysia. Traditionally, dadiah is made by fermenting milk in asam gelugur (*Garcinia atroviridis*), and adding the whey (inoculum) produced to sweetened fresh milk, which is then steamed. The traditional method makes use of heat to form a curd, which will destroy nutrients and also beneficial microorganisms present. In this study, gelatin is used to aid the formation of a gel, thus eliminating the need for heat treatment. Isomalt is used as a sugar substitute to develop a low calorie, sugar-free product. The addition of mango fruit will increase the nutritional content of the product, besides providing nutrients for the proliferation of beneficial bacteria from the inoculum. Four treatments, namely dadiah with sucrose (S), which acts as a control, dadiah with isomalt (I), dadiah with sucrose and added mango (SM) dadiah with isomalt and added mango (IM) were studied. Chemical analyses were carried out on the pH, total titratable acidity (TTA), total soluble solids (TSS), β -carotene and vitamin C. Physical analyses carried out included texture profile analysis (TPA) and colour. A sensory evaluation test was also carried out using a 9 point hedonic test. There was a significant difference ($p < 0.05$) between (I) and (S) for pH, TTA, and TSS, while the texture and colour were not significantly different for β -carotene and vitamin C. The hedonic test showed that panels preferred dadiah with sucrose and added mangoes in terms of taste, aroma and overall acceptability, while sucrose based dadiah was preferred in terms of texture and colour.

E03 Development of sugar free, low calorie hard herbal candy

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Conventional hard candies and sugar free hard candies (using isomalt and xylitol) both using herbal extracts (nutmeg and lemuni) were formulated. Effects of citric acid on conventional candies and sugar free candies were studied. Isomalt has half the calories of sugar and is widely used in imported confectioneries. Isomalt is being used in a few confectionery products in this country. Physiochemical analyses were carried out on moisture content, hygroscopicity, texture and colour of the candies. The organoleptic properties of the candies were analysed using a hedonic test, while their microstructures were examined using SEM. The addition of citric acid significantly increased the moisture content of both the conventional candies and sugar free candies ($p < 0.05$). During storage (30°C, RH 70%) for 8 days, the sugar free candies absorbed significantly ($p < 0.05$) less amount of moisture compared to conventional candies. Sensory evaluation using ranking tests substantiates this finding as the sugar free candies were found to be less sticky. The addition of herbs lowered the score for colour in the hedonic test, but the overall acceptance showed that both types of candies were equally liked by the panels. Micrographs from the SEM did not show any presence of crystallisation in the sugar free candies compared to the conventional candies where some area showed the formation of small crystals.

E04 Sensory acceptance of foods prepared with coconut milk among overweight and obese men

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Coconut milk is one of the main ingredients in Malay cuisine. When mixed with curries, *rendang* and *kuih*, it gives colour, aroma and taste. The objective of this study was to conduct sensory acceptance of dishes containing coconut milk among overweight and obese men. A total of 25 overweight and obese men were recruited as untrained taste panelists. The sensory assessment carried out were presentation and taste or sampling of foods. The dishes identified for the sensory assessment were chicken curry and *bubur kacang*. The recipes for these dishes had been standardised during the previous study. These dishes were cooked on the same day of the assessment and were served warm to the taste panelists. A total of 13 attributes were used to assess chicken curry. They were aroma, texture that includes appearance, stickiness, fibrous and flavour such as sweetness, saltiness, fatty taste, oiliness, creaminess, spiciness, chilli hot, and overall acceptance. For the *bubur kacang*, 2 attributes which were not related, spiciness and chilli hot, were removed. These attributes were assessed using the hedonic scale of 1 to 5. The scale of 1 being not acceptable, 4 being acceptable and 5 being extremely acceptable. The results of the study indicated that the chicken curry and *bubur kacang* presentation assessment showed similar scores of 3 (moderately attractive) to 4 (attractive) for aroma and appearance attributes. As for the taste assessment chicken curry and *bubur kacang* also shared similar scores for saltiness, creaminess and stickiness texture attributes. In conclusion the foods prepared with coconut milk were well accepted in appearance and taste specifically the aroma and creaminess.

E05 Nutrition labelling knowledge, attitude and practices among food manufacturers in Selangor

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The Food (Amendment) Regulations 2003 of Malaysia require mandatory nutrition labelling for several processed foods. How well do food manufacturers understand the prescribed guidelines? What problems do they encounter in complying with the requirements? This study was conducted to assess nutrition labelling knowledge, attitude and practices among food manufacturers in Selangor. A total of 60 food manufacturing companies were randomly selected from the Federation of Malaysian Manufacturers (FFM) Directory. Due to low initial response, letters were posted to another 40 food manufacturing companies also randomly selected from the FMM list. A total of 32 companies agreed to be interviewed. Being busy with preparation of annual audit reports, and promotion campaigns for festivals were the reasons given by most companies for non-participation in the study. Ten (34.3%) were small size food companies, 9 (24.1%) medium size and 13 (40.6%) large size according to FMM criteria. Half of the food companies were located in Klang and Shah Alam. The mean number of years of operation was 23.5 ± 25.3 , while the mean number of employees was 242 ± 576 . About one-third (31.3%) were manufacturers of sauces and pastes, followed by 21.9% in production of soft drinks and fruit juices. Majority of the company officers responsible for nutrition labelling were Quality Control executives (28.1%), followed by Research & Development officers (21.9%) and Food Technologists (12.5%). The main sources of information on nutrition labelling were FFM (53.1%) and Ministry of Health (MOH) (37.5%). Based on 25 questions that focused mostly on the Food (Amendment) Regulations, the large manufacturers obtained scores in the middle to high tertiles for marks, while most of the small size and medium size companies scored in the low to middle tertiles. All the respondents believed they had a responsibility to provide consumers with reliable nutrition information. More than half (53.2%) believed consumers had a poor understanding of nutrition labelling. While all the companies included carbohydrate, energy, protein and fat as required, several did not comply with having "per serving" information. They used "per 100g" or "per 100 ml" in the labels. Half of the respondents faced additional costs for printing new labels, while several (61.5%) large manufacturers expressed dissatisfaction with the transition period as insufficient for them to use up their old labels. Other problems encountered included difficulty with providing nutrient content and following the nutrition label format. In order to encourage food manufacturers to produce nutritious products and increase their compliance with nutrition labelling regulations, there should be periodic evaluation on the application of the Food (Amendment) Regulations among food manufacturers throughout Malaysia. More studies should also be undertaken on consumer behaviour in utilising nutrition labelling to make healthful choices.

E06 Antibiotic resistance of *Vibrio parahaemolyticus* isolated from Cultured Tiger Prawn (*Penaeus monodon*) in Malacca, West Malaysia

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The identity of *Vibrio parahaemolyticus* as a foodborne gastroenteritis agent was made first by Fujino in 1951 (Jay, 2000). Gastroenteritis is the most common human clinical infection caused by *Vibrio parahaemolyticus*. Antibiotic susceptibility pattern has long been utilised as useful epidemiological markers since it is very simple to perform and the results can be obtained in a very short time and are easy to interpret (Tenover *et al.*, 1995). In this study, there were seven groups of antibiotics tested namely, the Aminoglycosides, β -lactams, Cephalosporins, Glycopeptides, Macrolides, Quinolones, Tetracyclines and others. Isolates obtained from Cultured Tiger Prawn (forty-nine isolates tested) were highly resistance to Ampicillin (100%), Penicillin (100%), Cefuroxim (100%), Teicoplanin (100%), Erythromycin (98%), Rifampicin (98%), Trimethoprim (98%), and Streptomycin (96%). However, they were sensitive to Quinolones and Tetracyclines groups of antibiotic. The antibiotic resistance profile patterns can be classified into four groups. In this study, MAR index ranged between 0.40 and 0.60. According to Krumperman *et al.*, (1983), Multiple Antibiotic Resistance (MAR) index values higher than 0.2 are considered to have originated from higher risk sources of contamination like human, commercial poultry farms, swine and dairy cattle where antibiotics are often used. Some antibiotics given to threat vibriosis are tetracycline, ampicillin, chloramphenicol, cotrimoxazole and ciprofloxacin (Albert *et al.*, 1993). However, in this study a wide spectrum of antibiotics was used to observe the susceptibility of the *Vibrio parahaemolyticus* strain towards the antibiotics. Our results suggested that *vibrio spp* strains should be monitored carefully to detect those with antibiotic resistance potential. The results of this study provide useful information in the search for safe and efficient antibiotics. In addition, it also gives some insight into the problems faced by prawn culturists.

E07 Effects of cooking on vitamin E and A contents of beef burgers blended with palm fats

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Heat is applied to food in different ways to improve its hygienic quality, to enhance its flavour and taste, and to increase shelf life. The effects of cooking (frying) on vitamin E and A of beef burgers substituted with palm fats were studied. The treatments for palm fat blends to replace beef fat in beef burger consists of palm fat (PF), red palm fat (RPF35) and a combination of palm fat and red palm fat (FB) at 1:1 ratio at 15% of fats. Beef burgers were cooked for 7 min (internal temperature, 72-74°C). Fat was extracted using a method based on Kinsella *et al.* (1977). The contents of vitamin E and carotenes and its homologues were determined using HPLC. Results showed that total vitamin E decreased by 28%-30% and 28-58% respectively in raw and cooked beef burgers after storage for 6 months at -18°C. Alpha-tocopherol in all cooked beef burgers significantly decreased ($P < 0.05$) in the range of 62-64% with PF cooked beef burgers recording the highest concentrations after storage. Alpha-carotene content decreased by 47% and 36% respectively in RPF35 and FB beef burgers after frying. Beta-carotene also decreased by 62% and 48% respectively in RPF35 and FB beef burgers after frying. In summary, the effect of cooking, frozen storage and the type of fats used could influence vitamin E and carotene contents in beef burgers.

Group F: Experimental Nutrition

F01 The effect of "black seed" (*Nigella sativa* L.) cultivated in Yemen and its oil on atherogenesis in hypercholesterolaemia induced rabbits

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Black seed (*Nigella sativa* L.) is an annual herbaceous plant, which belongs to the Ranunculacea family. *Nigella sativa* seeds have been shown to produce many beneficial effects in both animals and humans. This study attempted to discover the effect of *Nigella sativa* seed cultivated in Yemen and its oil on the atherosclerosis in diet-induced hypercholesterolaemic rabbits. Twenty five adult male New Zealand white rabbits, weighing 1.5-2.5 kg were divided into two groups: normal group (NC), (n=5) and cholesterol group (n=20). Hypercholesterolaemia was induced by feeding rabbits with 0.5% (w/w) cholesterol supplemented to the diet for three weeks. Hypercholesterolaemic rabbits were then divided into 4 groups (n=5), one group was fed the normal diet prepared and did not receive treatments and served as a control for the hypercholesterolaemic group (PC) whereas, the other three groups were fed the normal diet with 5% (w/w) *Nigella sativa* in powder form (NSP), 2% (w/w) *Nigella sativa* oil (NSO) and 10 mg/kg/day simvastatin by force feeding for eight weeks. At the end of the experiment, rabbits were dissected, and the aortas were taken for analysis of atherosclerotic lesions by planimetry after the Sudan IV stain and for histological examination of the thickness of the intima and the intima to media ratio. Results show that rabbits induced with 0.5% (w/w) cholesterol had plaque formation in the abdominal aorta, which led to a significant increase ($p < 0.05$) in the thickness of the intima and the intima to media ratio in cholesterol group as compared to the NC group. Plaque formation was significantly inhibited and the intima: media ratio significantly decreased in the *Nigella sativa* treatment groups and simvastatin group as compared to the PC group. In conclusion, this study indicates that the treatment with *Nigella sativa* and simvastatin has anti-atherogenic effects.

F02 The effects of fried palm oil on lipid profile of normal rats

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The effects of chronic consumption of fresh and heated palm oil on body weight, lipid profile; total cholesterol (TC), low density lipoprotein-cholesterol (LDL), triglyceride (TG), high density lipoprotein-cholesterol (HDL), TC/HDL ratio and malondialdehyde (MDA) on normal rats was investigated. Twenty-four male Sprague Dawley rats (2 months old), weighing 200-250g were randomly divided into 4 groups that were given basal diet with 15% (w/w) (i) fresh palm oil (FPO), or (ii) heated once palm oil (1H-PO) or (iii) heated 5 times palm oil (5H-PO) or (iv) heated 10 times palm oil (10H-PO) for 8 weeks. Body weights were recorded weekly and their fasting blood samples were collected monthly into EDTA tubes through cardiac puncture. Blood was centrifuged to obtain plasma. Plasma was used to determine the lipid profile using enzymatic colorimetric test, and lipid peroxidation. Data were analysed with One-Way ANOVA and paired-samples t test using SPSS v12.0. In general, there was significant increase ($p < 0.05$) of body weight in all the groups throughout the study. The weights gained between groups were not significantly different. Instead, weight gained between 1H-PO and 5H-PO at week 3; 1H-PO and 5H-PO at week 4; and 5H-PO and

10H-PO at week 6 were significantly different ($P < 0.05$). There was a significant increase in TC for FPO and 1H-PO ($p < 0.05$) and for 5H-PO and 10H-PO ($p < 0.01$). The LDL-cholesterol concentration in FPO also increased significantly ($p < 0.01$) compared to baseline value and also to 1H-PO, 5H-PO and 10H-PO groups. However, the transient changes observed in plasma TG were significantly decreased for 1H-PO and 10H-PO ($p < 0.05$). The other groups did not attain significant values of TG during this study. The HDL-cholesterol concentration was significantly increased for 10H-PO ($p < 0.01$) and 5H-PO ($p < 0.05$), but not for FPO and 1H-PO. There was a significant increase in MDA concentration for 1H-PO ($p < 0.05$) and 5H-PO ($p < 0.01$) after 8 weeks of feeding compared to their respective baseline concentrations. No significant difference in FPO and 10H-PO was found. In addition, the value of TC/HDL ratio in 10H-PO initially increased, but then decreased significantly to lower ($p < 0.05$) than baseline level at the end of the study. There was no significant difference in the value of TC/HDL ratio between the groups, except between FPO and 10H-PO at week 8 ($p < 0.05$). In conclusion, both fresh and heated palm oil appeared comparable in their effect on plasma cholesterol and lipid peroxidation and this shows that long term feeding with fresh and heated palm oil will not have an adverse effect on serum on plasma TG, LDL-cholesterol, TC/HDL ratio and MDA concentration. In addition, this study also shows that consumption of fresh and heated palm oil for a prolonged period may result in a sustained increase in HDL-cholesterol. Further studies are required to ascertain whether the increase in LDL-cholesterol in fresh oil and MDA with heated oil would render it more atherogenic.

F03 Effect of red pitaya fruit (*Hylocereus Sp.*) supplementation on blood glucose level and lipid profiles of induced hyperglycaemic rats

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This study was conducted to investigate the effect of red Pitaya (*Hylocereus sp.*) supplementation on blood glucose and lipid profiles level of induced Diabetes Mellitus rats. A total of 60 male Sprague Dawley rats were used and the duration of the study was 7 weeks. Rats were divided into 6 groups: group 1 - normal control; group 2 -diabetic control; group 3, 4, 5, diabetic with red Pitaya treatment (300 g, 500 g, 700 g equivalent to human consumption) and group 6 - diabetic with glibenclamide treatment. During the 7 week-study, normal and diabetic control groups were given only normal diet (basal diet), diabetic with red pitaya treatment received additional 300 g, 500 g and 700 g/day red pitaya, meanwhile the diabetic with glibenclamide treatment group were force-fed 10mg/kg of glibenclamide daily. Results showed that after 6 weeks of supplementing red pitaya, the level of blood glucose reduced significantly by about 28.08% (300g), 33.16 % (500 g) and 35.26% (700 g) respectively, as compared with the baseline level. Total cholesterol reduced significantly at 54.29% (300g), 51.90% (500g) and 55.15% (700g) as compared with the baseline level. The TG level for all groups showed a significant reduction with value of 56.46% (300g), 52.52 % (500g), 43.34 % (700g) and 59.74 % (glibenclamide) as compared to the baseline level. The LDL-cholesterol level reduced significantly by about 83.06% (300g), 83.61% (500g) and 79.76% (700g) compared with the baseline level. The HDL-cholesterol for the three treatment groups increased significantly by about 98.36% (300g), 204.14% (500g) and 150.52% (700g) compared with the baseline level. This study suggests that red Pitaya fruits have a potential in reducing the blood glucose, TC, TG and LDL-C levels and increasing HDL-C levels among the diabetes mellitus subjects.

F04 Effect of phytic acid on the proliferation of ovary cancer cell line (Coav-3), breast cancer cell line (MDA-MB-231), and liver cancer cell line (HepG2)

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Phytic acid has been shown to have some positive nutritional benefits. Potential nutritional importance demonstrated by phytic acid is on cancer prevention and therapeutics. Proposed mechanisms of action include antioxidant capability. This study can be divided into three parts. Part one involved the determination of phytic acid in rice bran using absorptionmetric method. Phytic acid was extracted using HCl with different variables. pH at 1.0; 0.66N HCl yielded the largest amount of phytic acid, which was 220.935 ± 0.694 $\mu\text{g}/\text{mL}$. Subsequently, neutralisation was performed before it could be applied for cancer cell treatment. Second part was to compare the antioxidant activity of rice bran phytic acid, corn phytic acid (commercial) and butylated hydroxytoluene BHT (synthetic antioxidant) using beta-carotene bleaching method. The mean \pm SD antioxidant activity (%) of rice bran phytic acid, corn phytic acid and butylated hydroxytoluene (BHT) were 94.358 ± 0.978 %, 56.891 ± 3.497 % and 82.214 ± 0.352 % respectively. Results show that there was a significant difference in antioxidant activity of rice bran phytic acid and corn phytic acid. Cytotoxic effect of rice bran phytic acid and corn phytic acid on ovary cancer cell line (Coav-3), breast cancer cell line (MDA-MB-231) and liver cancer cell line (HepG₂) were evaluated using [3-(4, 5-dimethylthiazol-2-yl)-5-(3-carboxymethoxyphenyl)-2-(4-sulfophenyl)]-2H-tetrazolium, inner salt (MTS) assay. Cell viability was detected by an enzyme linked immunosorbent assay (ELISA) reader at 490nm. IC₅₀ of rice bran phytic acid on Coav-3, MDA-MB-231 and HepG₂ cell lines were 3.450 ± 0.087 mM, 3.780 ± 0.191 and 1.657 ± 0.023 mM. Meanwhile IC₅₀ of corn phytic acid on Coav-3, MDA-MB-231 and HepG₂ cell lines were 3.763 ± 0.206 mM, 5.127 ± 0.520 mM and 4.963 ± 0.257 mM respectively. T-test shows that there was no significant difference ($p > 0.05$) between IC₅₀ of rice bran phytic acid and corn phytic acid on Coav-3 cell line. On the other hand, results showed that there was a significant difference ($p < 0.05$) between mean IC₅₀ value of rice bran phytic acid and corn phytic acid on MDA-MB-231 and HepG₂ cell lines. In conclusion, rice bran phytic acid and corn phytic acid exhibit antioxidant activity that might be one of the mechanisms of cytotoxic effect on Coav-3, MDA-MB-231 and HepG₂ cell lines.

F05 Study of total antioxidant activity and antiproliferation effects of various parts of papaya tree (*Carica papaya* Linn) on different human cancer cell lines

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Papaya tree and its parts have been used widely in our diet either by people in urban or rural areas and it has been believed to be nutritious in preventing chronic diseases as it is a natural anti-carcinogenic antioxidant agent. However, there is little knowledge about the effectiveness in preventing or inhibiting the development of cancer. In this study, the effects of pulp, leaves, flowers and seeds of papaya on the proliferation of liver cancer (HepG₂), cervical cancer (CaOV₃) and non hormone dependent breast cancer (MDA-MB-231) cell lines will be determined at different concentra-

tions of 5, 10, 20, 40, 60, 80, 100 µg/ml. Liver cancer cell line (HepG₂) was cultured in Dulbecco's modification of Eagle's Medium (DMEM) medium while the CaOV₃ and MDA-MB-231 cancer lines were cultured in Earl's Minimum Essential Medium (EMEM) medium. The cells were incubated for 72 hours at 37°C and with the use of 5% CO₂. The concentrations of the cell plates were 1 × 10⁵ cell/ml. The IC₅₀ values for each treatment were calculated from the graphs of percentage of cytotoxicity against varying concentrations of each extracts. Results showed that the extracts of the papaya's pulp, leaves and flowers had IC₅₀ value of 22 µg/ml ± 0.35, 42 µg/ml ± 0.71 and 22.5 µg/ml ± 0.49 respectively against HepG₂. The papaya's seeds had IC₅₀ for all the concentration against MDA-MB-231. Other treatments demonstrated no appreciable anti-proliferative activity. As for the determination of antioxidant activity, the DPPH free radical scavenging effect and determination of total phenolic methods were applied. The DPPH assay and total phenolic assay were measured by UV - Vis spectrophotometer at 517 nm and 725 nm respectively. The percentage of antioxidant activity was presented as the percent of inhibition relative to control. The total phenolic content of each sample was determined by comparing between the sample extracts with the standard-phenolic. The one - way ANOVA test showed that the DPPH free radical scavenging of the extracts had significant difference with the value of F = 71.375; p = 0.000 (p < 0.05) between percentage of total antioxidant activity in each extracts sample of pulp, leaves, flowers and seeds of papaya. The determination of total phenolic method also showed a significant difference with the value of F = 602.4; p = 0.000 (p < 0.05) between total phenolic content of each selected sample of *Carica papaya* Linn. Meanwhile, each selected sample showed significant correlation at a level of 0.01 (2 - tailed) with the "Pearson Correlation" value = 0.779. In conclusion, the study showed that the extracts of pulp, leaves and flowers of *Carica papaya* Linn were able to inhibit the proliferation of liver cancer (HepG₂) cell lines. Extract of *Carica papaya* Linn's seeds was able to inhibit the proliferation of non hormone dependent human breast cancer (MDA-MB- 231). Furthermore, significant difference in total antioxidant activity percentage and total phenolic content were detected in the four samples by the DPPH free radical scavenging and determination of total phenolic content methods applied.

F06 Synergistic effect of rice bran antioxidants on lipid profile of rats

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The potential health benefits of various components of rice bran oil in health maintenance and diseases prevention has recently received considerable attention. The focus has been on oryzanol and vitamin E, especially the tocotrienols which are believed to have curative function for various human diseases. Thus, this study was carried out to examine the effect of oryzanol, tocotrienol and combination of both antioxidants on plasma lipid profile in rats. Four groups of 10 male Sprague-Dawley rats were maintained on the following diets for eight weeks: High cholesterol diet (HCD) group (normal rat chow + 1% cholesterol + 0.15% cholic acid), oryzanol group (HCD + 0.5% oryzanol), tocotrienol group (HCD + 0.5% tocotrienol) and oryzanol + tocotrienol group (HCD + 0.5% oryzanol + tocotrienol). All rats for treatment groups were treated daily by oral gavage during eight weeks. Rats fed with combination of oryzanol + tocotrienol had lower (1.44 mmol/L) plasma total cholesterol compared to other groups at the end of eight weeks treatment. A comparison between these plasma cholesterol levels with HCD group showed that combination of oryzanol + tocotrienol caused 10% plasma total cholesterol reduction for a duration of eight weeks. These results indicate that various components of rice bran have the potential to be used as a hypocholesterolaemic agent.

F07 Study of the effect of nipple fruit (*Solanum mammosum L.*) decoction in diabetic rats induced with streptozotocin

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Traditionally, nipple fruit (*Solanum mammosum L.*) is believed to have anti-diabetic properties. This study was carried out to examine the effect of nipple fruit (*Solanum mammosum L.*) decoction on plasma glucose levels in diabetic rats induced with streptozotocin (STZ). Parameters used were plasma glucose, lipids profile (cholesterol, HDL-c, LDL-c and triglyceride), level of plasma total antioxidant activity (FRAP value), level of plasma malonaldehyde (MDA) and body weight. Three concentrations of *Solanum mammosum L.* (SM) used in this study were 2.5%, 5.0% and 7.5% (w/v). Blood samples were collected from intracardiac at days 0 and 21. Automated Clinical Chemistry Analyzer was used to determine the plasma glucose and lipid profiles. After the treatment with nipple fruit decoction, there was no significant difference ($p>0.05$) in the level of plasma glucose for normal and diabetics rats. There was no significant difference ($p>0.05$) for the average of total cholesterol, LDL-c and triglyceride in diabetic rats. HDL-c showed significant increment ($p<0.05$) in diabetic rats which received 2.5% (w/v) SM decoction. Percentage of the increment in min plasma HDL-c was 14.94%. Total antioxidant activity was measured using ferric reduction/antioxidant power test (FRAP assay). Normal and diabetic rats showed no significant difference ($p>0.05$) after treatment as compared to before treatment except for the group that received 5.0% (w/v) SM decoction that showed significant increment ($p<0.05$). TBA assay was used to measure plasma MDA values. There was no significant difference ($p>0.05$) for the level of plasma MDA after treatment as compared to before treatment in normal rats. All diabetic rats showed significant difference ($p<0.05$) in MDA plasma level after treatment. Effects on the body weight for all normal groups showed significant increment ($p<0.05$). Effect of decoction SM on all groups showed significantly decreased body weight ($p<0.05$). This study showed that SM decoction cannot reduce the glucose level significantly and could not improve the lipid profile, total antioxidant activity, plasma MDA level and body weight.